Overview of Trends in
Canadian
mineral
exploration

CANADIAN INTERGOVERNMENTAL WORKING GROUP ON THE MINERAL INDUSTRY

2003

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Overview of Trends in

Canadian mineral exploration

Canadian Intergovernmental Working Group
on the Mineral Industry

2003

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COVER PHOTO BY GARY DELANEY, SASKATCHEWAN INDUSTRY AND RESOURCES

The cover photo shows the headframe for the shaft and the support camp at Shore Gold Inc.'s Star diamond project, in the Fort-à-la-Corne forest, 60 km east of Prince Albert, Saskatchewan. This project is designed to recover a parcel of at least 3000 carats of diamonds to enable an accurate valuation of the stones. Up to 25 000 tonnes of kimberlite will be recovered from the shaft and drifts and will be processed on site to produce this diamond parcel.

Preface

This report is prepared annually, on behalf of the Intergovernmental Working Group on the Mineral Industry (IGWG), for presentation to federal, provincial and territorial mines ministers. It contains information, current as of October 2003, on recent exploration and deposit appraisal spending levels in Canada, a review of exploration and deposit appraisal activities in the provinces and territories, and analyses of domestic and international trends affecting the Canadian mineral exploration sector.

The analyses, articles and reviews found in this report were prepared by officials from respective provincial/territorial departments responsible for mineral exploration and from Natural Resources Canada (NRCan). The Minerals and Metals Sector of NRCan was responsible for compiling, editing, producing and distributing this report, which covers exploration and deposit appraisal activities for metallic minerals, nonmetallic minerals, coal and uranium. It does not refer to petroleum-related work.

The report can be accessed on the Internet at www.nrcan.gc.ca/mms/pubs/explor_e.htm.

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For further information on specific issues related to this report (i.e., exploration activities, incentives and programs, rules and regulations, geoscientific data, etc.), the reader is invited to contact the appropriate federal, provincial or territorial authorities at the telephone numbers listed below or to consult their respective web sites. The contact information for officials who prepared the provincial/territorial sections are also provided at the beginning of each of these sections while the NRCan officials who participated in the preparation of this report are listed below. Prince Edward Island is not included because of a current lack of mineral exploration activity.

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Executive Summary

Statistics from the federal-provincial/territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures show that all-inclusive exploration and deposit appraisal spending has rebounded after declining significantly from the 1997 level of $921 million to $497 million in 2000. Most of that decline occurred in 1998 when expenditures dropped by $265 million (29%) to $656 million. Another significant decline of 23% occurred between 1998 and 1999 when exploration and deposit appraisal expenditures dropped by a further $152 million to $504 million.

The recovery began in 2001 when expenditures of $513 million were recorded and it gained momentum in 2002 with spending of $573 million. Company spending intentions of $684 million for 2003 (compiled in August 2003) indicate further strengthening of the Canadian mineral exploration and deposit appraisal sector. The exploration work phase, which has experienced steady improvement since 2000, is expected to account for 76% ($521 million) of this $684 million total while the remaining 24% ($163 million) is expected to be incurred for deposit appraisal activities.

Factors that contributed to this recovery include stronger metal prices, exciting diamond discoveries, timely tax incentives, and easier access to capital markets. At the end of 2003, all of these factors appeared poised to continue to positively influence spending in 2004. A cloud on the horizon is that most of the temporary federal/provincial tax credits that were introduced in recent years to boost flow-through-share-financed activity are scheduled to lapse at the end of 2004.

Along with the other factors mentioned above, these exploration tax credits have helped turn around a struggling Canadian junior mining sector. For 2003, junior company spending, which had been particularly affected by the downturn that began after 1997, is expected to be higher for the fourth consecutive year and to reach a level of $281 million.

While a stronger junior mining sector and an increase in grass-roots exploration are good news, increased deposit appraisal, on-mine-site and senior company spending are needed to add to the inventory of economically mineable deposits and replace depleted ore reserves at existing mines. As a group, senior companies have severely curtailed their exploration and deposit appraisal budgets in recent years. A forecast increase of their spending to $404 million for 2003 and a positive metals prices outlook could lead to a more intense effort by this type of company.

A breakdown of expenditures by commodity sought is only available for 2002, but the shift in the traditional distribution of exploration and deposit appraisal funds that was identified for 2001 was again evident. Diamonds-related expenditures surpassed those aimed at discovering base metals for the second year in a row. With exploration and deposit appraisal expenditures of $162 million in 2002, diamonds continued to draw considerable interest from both junior and senior companies, second only to precious metals.

As detailed in the Regional Outlook section of this report, many interesting exploration and deposit appraisal projects are currently under way in Canada. Federal, provincial and territorial governments continue to support and promote exploration and deposit appraisal activities in their respective jurisdictions through various initiatives, including innovative fiscal incentives, the resolution of land access issues, and the provision of state-of-the-art geoscientific data.

Canada now ranks first in terms of countries where the world's larger mineral exploration companies are the most active, being the recipient in 2002 of 16% of these companies' investments in exploration. As for the larger Canadian companies, they were expected to undertake 32% of all the exploration programs in the world in 2002, a share that is by far the largest of the global mineral exploration market.

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ABBREVIATIONS

The reader should note that a number of abbreviations for common units of measurement appear in the text:

cm	centimetres
ct	carats
ct/t	carats per tonne
ct/y	carats per year
ft	feet
g	grams
g/t	grams per tonne
ha	hectares
kg	kilograms
km	kilometres
km^2	square kilometres
lb	pounds
m	metres
Mct	million carats
Mct/y	million carats per year
Mha	million hectares
Mt	million tonnes
Mt/y	million tonnes per year
oz	troy ounces
oz/y	ounces per year
ppb	parts per billion
ppm	parts per million
st	short tons
t	tonnes (metric)
t/d	tonnes per day
t/y	tonnes per year
tU	tonnes of uranium

Note: Unless specified otherwise, all dollar figures are in Canadian dollars.

1. Indicators of Mineral Exploration and Deposit Appraisal Activity in Canada

1.1 INTRODUCTION

The first chapter of this report presents data and analysis on indicators of mineral exploration and deposit appraisal activity in Canada. Except where needed for comparing different data sets, it does not cover activities beyond the deposit appraisal stage, such as those related to mine development. The most important of the indicators studied in this report is spending and, accordingly, most of the analysis focuses on expenditure trends and patterns. Chapter 1 also provides analysis on two other indicators of exploration and deposit appraisal activity: drilling and claim staking.

The Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures was redesigned in 1997 to provide a more comprehensive breakdown of the mineral development cycle in Canada. This breakdown is based on the generalized model of resource development and mining process (**Table 26** in Appendix 2). The introduction of new cost categories such as engineering, environment, feasibility studies and land access, and a clearer separation between the different work phases, offer expanded analytical options over the pre-1997 survey format. While the former survey data continue to be used to show some historical trends, the analysis in this report is primarily based on the set of definitions[1] that was adopted in 1997. For a better understanding of these definitions and the redesigned survey, the reader is invited to consult Section 1.2 and Appendix 2.

A further change to the survey methodology was tested and adopted in 2002. The confidence level of the survey of company spending intentions for a given year, which is conducted in the last quarter of the previous year and compiled in January of the forecast year, is now bolstered by a revised survey of spending intentions that is conducted in the first half of the forecast year. The results of this "revised intentions survey" are released in August, seven months after the release of the original spending intentions forecast. All companies that had reported spending intentions during the first forecast compilation, as well as those that had failed to do so, are surveyed again as to how close they are from their previously reported spending plans. This new feature improves the forecast capabilities of the entire survey process and provides more timely information on the actual state of mineral exploration for industry stakeholders and decision makers at the provincial-territorial and federal levels of government.

1.2 SUMMARY OF SURVEY DEFINITIONS

In the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures, often referred to as the federal-provincial/territorial survey of mining and exploration companies, exploration is defined as the work carried out on- or off-mine-site to search for, discover and carry out the first delineation of a previously unknown mineral deposit to establish its potential economic value (tonnage and grade) and to justify further work. Deposit appraisal, on the other hand, includes the work carried out on- or off-mine-site to bring a delineated deposit to the stage of detailed knowledge required for a production feasibility study.

---

[1] A different set of definitions is used in Chapter 3 for international exploration. It is based on data from the Metals Economics Group.

The more detailed cost breakdown of the new survey format adopted in 1997 provides exploration and deposit appraisal expenditures that are generally higher than the ones obtained for the traditional "field work and overhead costs" in the old survey simply because cost categories like engineering, economic and feasibility studies, environment, and land access were not previously accounted for. The survey also collects data on capital and repair costs for construction, machinery and equipment for each of the work phases (exploration, deposit appraisal and mine complex development), but these costs will seldom be referred to in this review. The comprehensive coverage offered by all these categories of expenditures provides a more complete picture of the total investment required to bring projects to the production decision stage.

1.3 EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES

Over the years, levels of exploration and deposit appraisal expenditures have been relied upon to determine the health of Canada's mineral exploration sector and to provide an insight into the future of the country's minerals and metals production capacity. This section focuses on analyzing expenditure data for 2002 and 2003.[2] The data for 2002 are considered to be final. The data for 2003 were compiled in January 2003 and revised in August 2003. They will be finalized in 2004. The section also provides some coverage of the seven-year period 1997-2003, which represents the first seven years of data for the redesigned survey.

1.3.1 2002 Exploration and Deposit Appraisal Expenditures

1.3.1.1 Statistical Summary

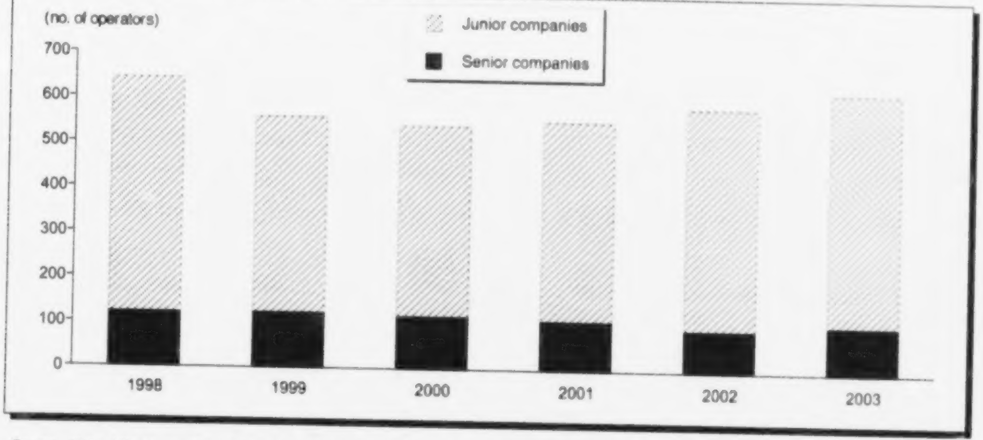
In 2002, 586 companies (project operators) and some prospectors spent $573 million on mineral exploration and deposit appraisal in Canada (**Figure 1**). That number of companies represented an increase of 6% from the 2001 total of 553 companies (expenditures of $513 million) and a further increase from the low of 541 project operators that was reached in 2000. There were 684 project operators in 1997, 643 in 1998 and 558 in 1999. A total of 89 companies (compared to 78 in 2001) spent more than $1 million each in 2002 (**Table 1**); these companies' expenditures accounted for 84% of the total expenditures for that year, practically the same proportion (83%) as that of the 78 companies in 2001.

Compared to 2001, spending decreases totalling $20 million were recorded in only three provinces and territories (**Figure 2** and **Table 2**). Exploration and deposit appraisal spending declined by almost $14 million in the Northwest Territories and by over $6 million in New Brunswick. The Yukon experienced a very minimal decrease in expenditures. In percentage terms, New Brunswick saw its spending decrease by two-thirds and the Northwest Territories by 16%. With the advent of a strong diamond mining sector, exploration and deposit appraisal spending in the Northwest Territories has depended alot in recent years on whether expenditures were taking place at the exploration and deposit appraisal stages or at the more advanced mine development stage, which would not show in the statistics discussed here. For New Brunswick, however, these data are much more alarming as spending continues to spiral downwards.

---

[2] For further analysis of 2002 exploration and deposit appraisal expenditures and a brief discussion of 2003 spending intentions, see Ginette Bouchard, "Mineral Exploration, Deposit Appraisal and Mine Complex Development Activity in Canada," in the 2002 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa.

Figure 1
Project Operators Active in Exploration and Deposit Appraisal in Canada, 1998-2003



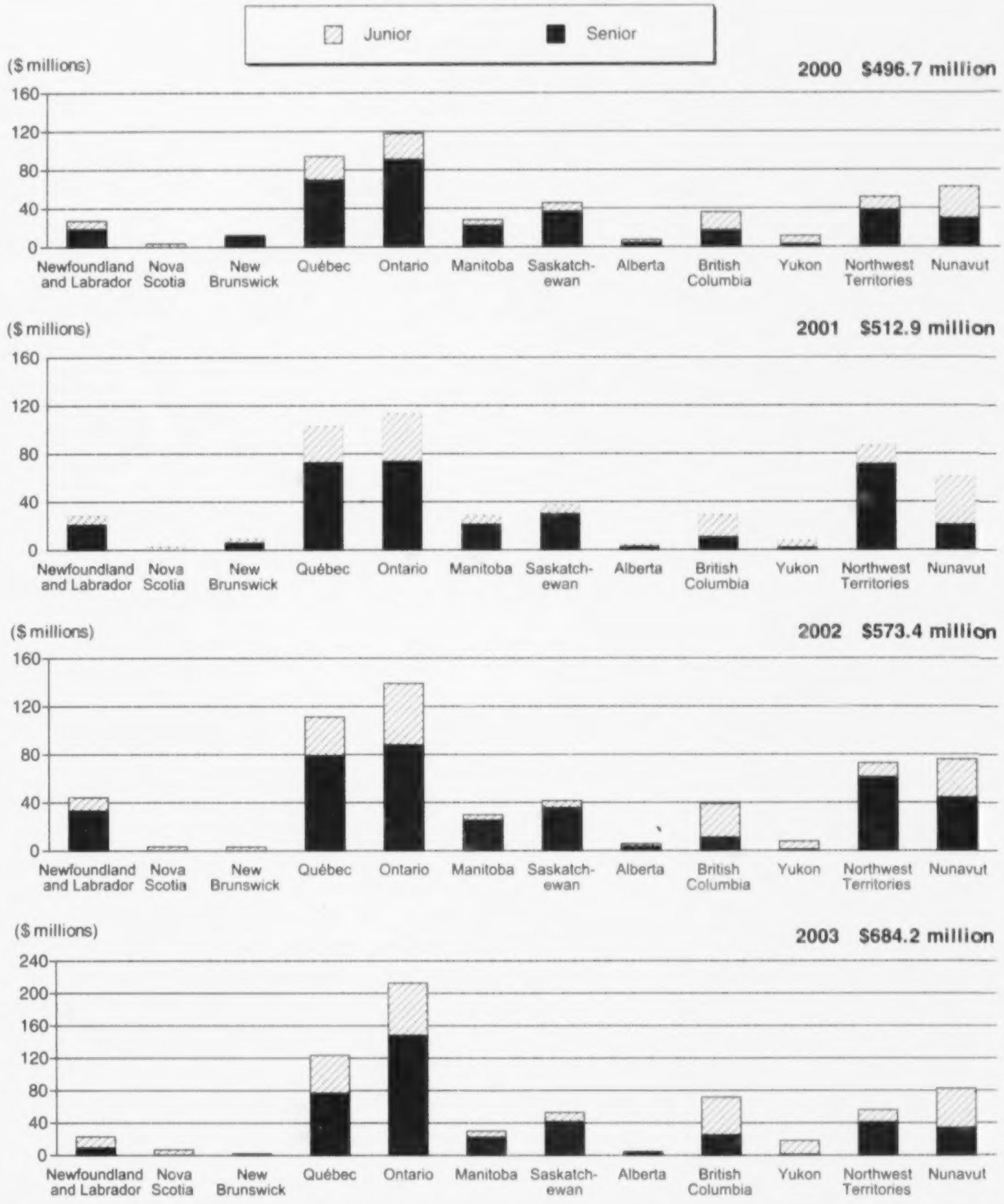
Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Data include prospectors and prospector groups. Data up to and including 2002 are final; 2003 data are based on revised company spending intentions as compiled in August 2003.

TABLE 1. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA, [1] **BY RANGE OF EXPENDITURES AND BY TYPE OF COMPANY, 2001-03**

Range of Expenditures	Junior			Senior			Total		
	Companies	Expenditures	Percentage of Total Junior Expenditures	Companies	Expenditures	Percentage of Total Senior Expenditures	Companies	Expenditures	Percentage of Total Expenditures
($)	(number)	($000)	(%)	(number)	($000)	(%)	(number)	($000)	(%)
2001									
>10 million	1	14 336	8.1	11	222 869	66.5	12	237 205	46.3
5 million-10 million	4	28 571	16.1	9	60 863	18.2	13	89 434	17.4
1 million-5 million	34	62 821	35.3	19	37 525	11.2	53	100 346	19.6
500 000-1 million	42	28 921	16.3	9	6 494	1.9	51	35 416	6.9
200 000-500 000	69	22 237	12.5	9	3 046	0.9	78	25 284	4.9
100 000-200 000	71	10 144	5.7	24	3 629	1.1	95	13 773	2.7
50 000-100 000	57	4 027	2.3	4	304	0.1	61	4 331	0.8
1-50 000	122	2 052	1.2	25	405	0.1	147	2 458	0.5
Subtotal	400	173 110	97.4	110	335 136	100.0	510	508 246	99.1
Prospectors (2)	43	4 623	2.6	–	–	–	43	4 623	0.9
Total 2001	443	177 733	100.0	110	335 136	100.0	553	512 869	100.0
2002									
>10 million	–	–	–	12	256 148	66.9	12	256 148	44.7
5 million-10 million	6	37 258	19.5	8	56 659	14.8	14	93 917	16.4
1 million-5 million	40	69 855	36.6	23	61 252	16.0	63	131 107	22.9
500 000-1 million	48	32 201	16.9	4	2 918	0.8	52	35 118	6.1
200 000-500 000	89	28 979	15.2	10	3 448	0.9	99	32 427	5.7
100 000-200 000	76	10 886	5.7	9	1 426	0.4	85	12 312	2.1
50 000-100 000	60	3 939	2.1	6	448	0.1	66	4 387	0.8
1-50 000	144	2 828	1.5	21	329	0.1	165	3 157	0.6
Subtotal	463	185 946	97.5	93	382 628	100.0	556	568 573	99.2
Prospectors (2)	30	4 847	2.5	–	–	–	30	4 847	0.8
Total 2002	493	190 793	100.0	93	382 628	100.0	586	573 421	100.0
2003									
>10 million	1	10 500	3.7	14	282 369	70.0	15	292 869	42.8
5 million-10 million	5	29 360	10.5	8	54 007	13.4	13	83 367	12.2
1 million-5 million	71	140 794	50.2	24	56 800	14.1	95	197 594	28.9
500 000-1 million	74	49 063	17.5	7	4 824	1.2	81	53 887	7.9
200 000-500 000	112	32 849	11.7	12	3 481	0.9	124	36 330	5.3
100 000-200 000	64	8 701	3.1	7	909	0.2	71	9 611	1.4
50 000-100 000	42	2 556	0.9	9	609	0.2	51	3 165	0.5
1-50 000	111	1 884	0.7	24	533	0.1	135	2 417	0.4
Subtotal	480	275 708	98.2	105	403 532	100.0	585	679 240	99.3
Prospectors (2)	39	4 986	1.8	–	–	–	39	4 986	0.7
Total 2003	519	280 694	100.0	105	403 532	100.0	624	684 227	100.0

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
– Nil.
(1) Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access expenditures. (2) Number of prospectors is underestimated because it contains groups of prospectors.
Notes: Data up to and including 2002 are final; 2003 data are based on revised company spending intentions as compiled in August 2003.

Figure 2
Exploration and Deposit Appraisal Expenditures in Canada by Junior and Senior Companies, by Province and Territory, 2000-2003



Sources: Natural Resources Canada and Statistics Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

Notes: Exploration and deposit appraisal activities include only the search for and appraisal of new deposits; they do not include work for extensions of deposits already being mined or committed to production. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2002 are final; 2003 data are revised company spending intentions as compiled in August 2003.

TABLE 2. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA, BY PROVINCE AND TERRITORY, 2000-2003

Province/Territory	2000		2001		2002		2003 (rsi)	
	($000)	(%)	($000)	(%)	($000)	(%)	($000)	(%)
Newfoundland and Labrador	27 316.7	5.5	28 441.7	5.5	44 183.9	7.7	23 029.0	3.4
Nova Scotia	3 584.9	0.7	2 819.4	0.5	3 386.2	0.6	6 908.0	1.0
New Brunswick	12 125.0	2.4	9 459.2	1.8	3 206.3	0.6	1 987.5	0.3
Québec	94 115.5	19.0	102 946.7	20.1	111 207.7	19.4	123 588.0	18.1
Ontario	117 939.3	23.7	113 639.5	22.2	138 969.5	24.2	212 606.2	31.1
Manitoba	28 120.5	5.7	28 666.7	5.6	29 831.3	5.2	29 994.2	4.4
Saskatchewan	45 590.0	9.2	37 535.1	7.3	41 426.2	7.2	52 926.1	7.7
Alberta	7 237.3	1.5	4 452.9	0.9	5 603.2	1.0	4 454.8	0.7
British Columbia	35 923.8	7.2	29 137.1	5.7	39 225.3	6.8	71 835.5	10.5
Yukon	11 233.1	2.3	7 807.5	1.5	7 794.0	1.4	18 347.6	2.7
Northwest Territories	51 369.3	10.3	86 645.3	16.9	72 734.6	12.7	56 146.3	8.2
Nunavut	62 095.7	12.5	61 318.1	12.0	75 852.5	13.2	82 403.6	12.0
Total	496 651.1	100.0	512 869.2	100.0	573 420.6	100.0	684 226.7	100.0
Exploration	342 524.8	69.0	381 172.5	74.3	403 544.9	70.4	521 463.2	76.2
Deposit appraisal	154 126.2	31.0	131 696.6	25.7	169 875.7	29.6	162 763.5	23.8

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(rsi) Revised spending intentions.
Notes: Data up to and including 2002 are final; 2003 data are based on revised spending intentions as compiled in August 2003. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Numbers may not add to totals due to rounding.

Spending increases totalling $81 million were recorded in the nine remaining provinces and territories. Ontario experienced the largest increase with a $25 million gain over the previous year. Newfoundland and Labrador (+$16 million), Nunavut (+$15 million) and British Columbia (+$10 million) also registered significant increases in spending. In decreasing order of amounts spent on exploration and deposit appraisal, Ontario, Québec, Nunavut and the Northwest Territories accounted for 70% of all such expenditures in Canada in 2002.

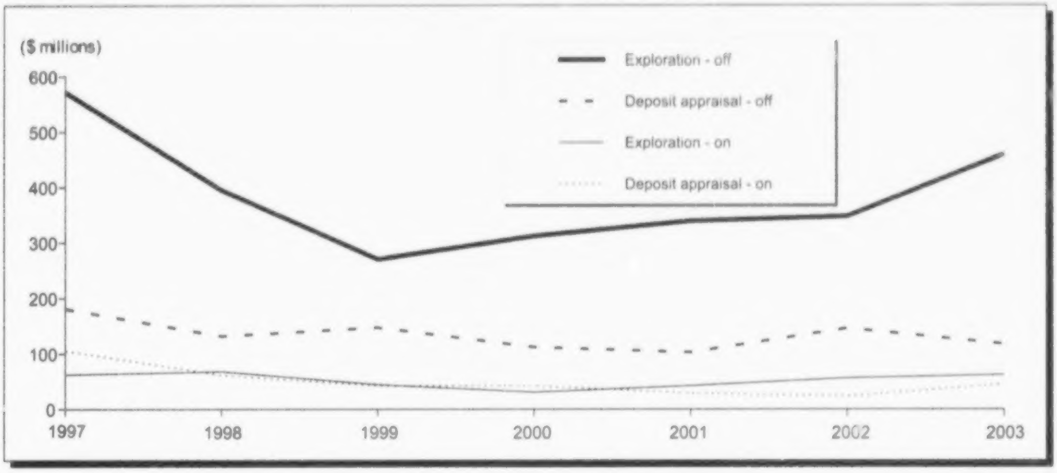
Expenditures for off-mine-site exploration and deposit appraisal activity increased by about 12% (to $493 million) from the 2001 level of $441 million (**Figure 3**). This total was still 35% less than the one recorded in 1997 when a total of $753 million was spent for off-mine-site exploration and deposit appraisal activities in Canada. Overall, 86% of all exploration and deposit appraisal expenditures in 2002 was for off-mine-site activity. Ontario ranked first overall in terms of off-mine-site spending with 21% of the total for that category, followed by Québec (16%), Nunavut (15%) and the Northwest Territories (15%) (**Figure 4**).

On-mine-site exploration and deposit appraisal expenditures increased by 12% to $80 million in 2002 from the 2001 level of $71 million. However, this amount represents only about half of the total of $168 million that was recorded in 1997 and is indicative of either a continued lack of focus on replacing depleting ore reserves at existing mine sites in Canada or a maturing industry that could end up losing some important players if the situation is not corrected. On-mine-site spending accounted for 28% of the exploration and deposit appraisal expenditures recorded in Québec, for 27% in Manitoba and for 24% in Ontario. A total of $72 million (90% of the Canadian total) was spent for on-mine-site exploration and deposit appraisal activities in those three provinces.

1.3.1.2 Spending by Work Phase

A breakdown of spending by work phase (exploration and deposit appraisal) shows that, in 2002, exploration expenditures amounted to $404 million (70% of total exploration and deposit appraisal spending) and deposit appraisal stood at $170 million (30% of total spending) (**Figure 5**). In 2001, spending on the exploration phase had amounted to $381 million while a total of $132 million was spent on deposit appraisal, representing an increase of 6% for the exploration phase and 29% for the deposit appraisal phase.

Figure 3
On-Mine-Site and Off-Mine-Site Exploration and Deposit Appraisal Expenditures (1) in Canada, 1997-2003



Source: Natural Resources Canada, from the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) On-mine-site and off-mine-site exploration and deposit appraisal expenditures include field work and overhead costs, plus engineering, economic and feasibility studies, environment and land access costs.
Note: Data up to and including 2002 are final; 2003 data are revised company spending intentions as compiled in August 2003.

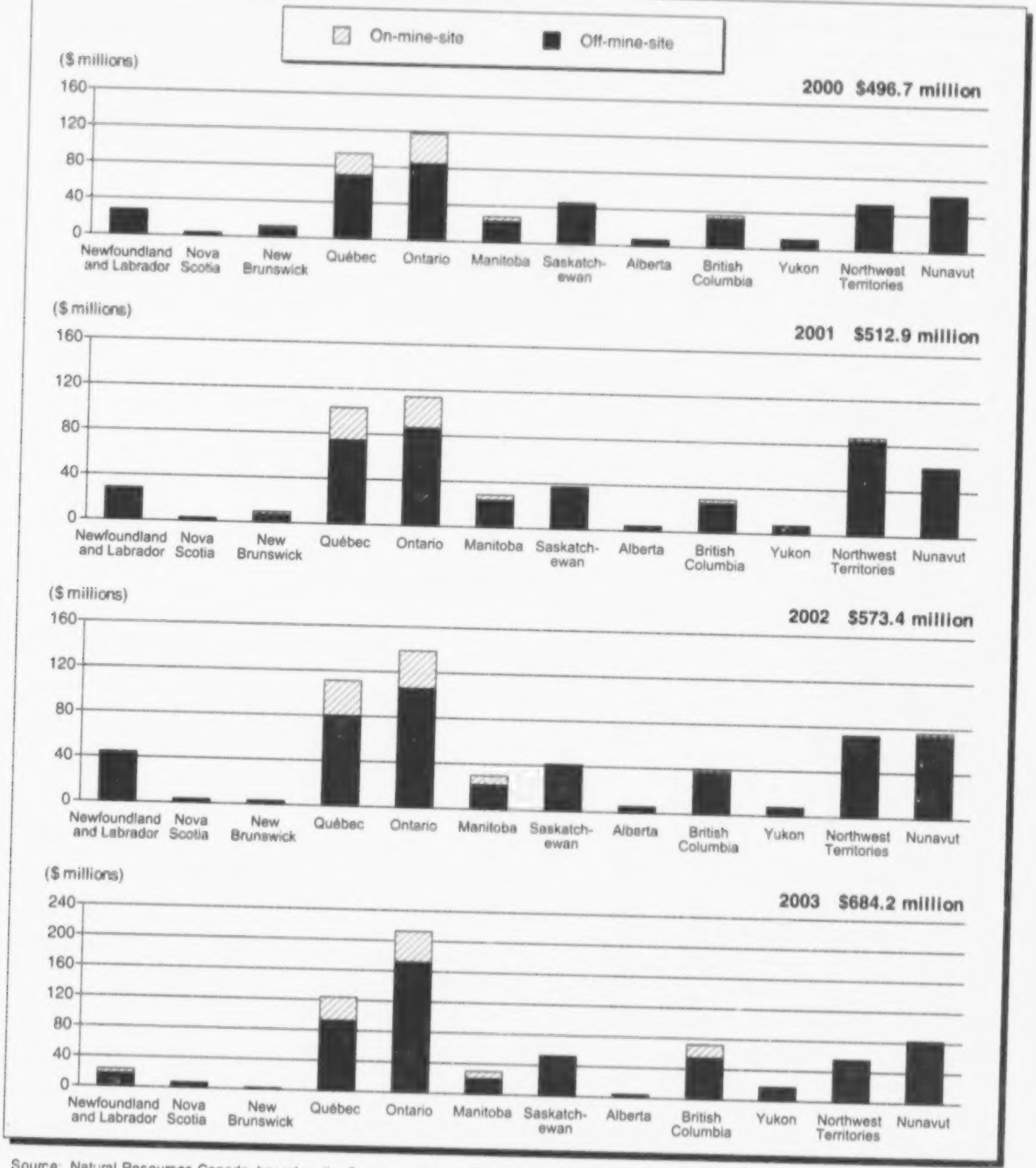
Off-mine-site spending of $347 million represented 86% of spending in the exploration phase in 2002 (**Figure 3**). Over the period 1997-2002, off-mine-site spending has consistently represented 85% to 90% of total exploration-phase expenditures. In terms of deposit appraisal expenditures, approximately 86% of the $170 million recorded for off- and on-mine-site deposit appraisal activities in 2002 was reported as off-mine-site spending. While this was the highest proportion of off-mine-site deposit appraisal spending in the 1997-2002 interval, this type of spending tends to be influenced by the size of specific projects rather than by their number and, accordingly, shows greater year-on-year variation.

A provincial/territorial breakdown of exploration and deposit appraisal expenditures reveals that all recorded spending in Alberta and New Brunswick in 2002 was reported as exploration-phase work (**Figure 6**). The Yukon (97%), Manitoba (92%), British Columbia (83%), Nunavut (81%), Ontario (78%) and Québec (73%) also recorded high proportions of exploration-related work. While these numbers show a marked preference for "grass-roots"-type exploration in these provinces/territories, they again highlight a worrisome lack of advanced projects.

The advanced stage of some diamond projects in the Northwest Territories continues to be reflected by the high proportion of deposit appraisal spending in that territory. In 2002, 60% ($44 million) of all exploration and deposit appraisal expenditures in the Northwest Territories was incurred for deposit appraisal activities, a proportion only surpassed by the 61% ($27 million) that was devoted to the deposit-appraisal stage in Newfoundland and Labrador where progress was achieved in moving the Voisey's Bay project ahead.

In terms of ranking by total exploration expenditures, Ontario placed first followed by Québec and Nunavut. For deposit appraisal spending, the Northwest Territories ranked first followed by Ontario, Québec, and Newfoundland and Labrador.

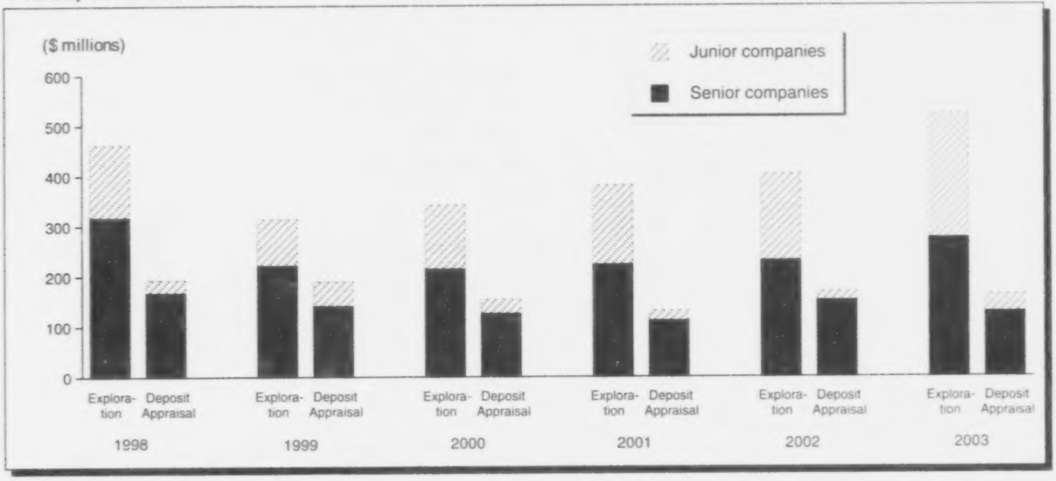
Figure 4
On-Mine-Site and Off-Mine-Site Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2000-2003



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

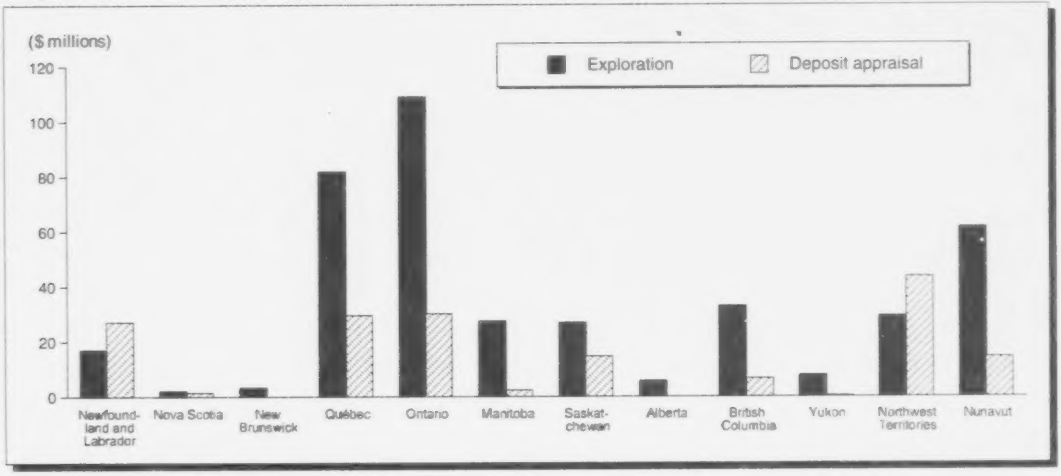
Notes: Exploration and deposit appraisal activities include only the search for and appraisal of new deposits; they do not include work for extensions of deposits already being mined or committed to production. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2002 are final; 2003 data are revised company spending intentions as compiled in August 2003.

Figure 5
Exploration and Deposit Appraisal Expenditures in Canada, by Type of Company and by Work Phase, 1998-2003



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2002 are final; 2003 data are revised company spending intentions as compiled in August 2003.

Figure 6
Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2002



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2002 are final.

1.3.1.3 Spending by Type of Activity

A detailed cost breakdown for each of the exploration and deposit appraisal phases shows that drilling (surface and underground) is the most important cost component in the discovery and delineation of a mineral deposit (**Figure 7**). In 2002, surface and underground drilling (diamond drilling and other types of drilling) accounted for 39% ($159 million) of the $404 million spent on the exploration phase. As can be expected, surface drilling accounted for the vast majority of drilling activity in that work phase. Geoscientific surveys (geology, geochemistry and geophysics) were equally important, also accounting for 39% ($157 million) of total exploration spending.

In the deposit appraisal phase, surface and underground drilling accounted for 31% ($53 million) of the total $170 million spent while the preparation of engineering, economic and feasibility studies was second with 29% ($49 million) of total deposit appraisal spending.

Overall, surface and underground drilling accounted for 37% ($213 million) of all exploration and deposit appraisal spending in 2002 while geoscientific surveys ranked second with 28% ($162 million).

As indicated earlier, the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures allows the tracking of exploration and deposit appraisal expenditures that are dedicated to categories of spending other than the traditional field work and overhead ones. As such, it is also possible to follow the spending evolution of other costs such as those related to the environment and land access (**Table 3**).

In 1997, a total of $47 million was recorded as environment-related expenditures (which include costs incurred for characterization, permitting, protection, monitoring and restoration), or 5% of all exploration and deposit appraisal expenditures for that year. This percentage remained the same in 1998 as a total of $32 million was directed at environment-related expenditures. It declined to 4% ($19 million) in 1999, 2% ($10 million) in 2000, and to only 1.6% ($8 million) in 2001. Environment-related expenditures finally rebounded in 2002 when they represented 3.4% ($20 million) of total expenditures. As can be expected, most of that $20 million was spent at the deposit appraisal stage.

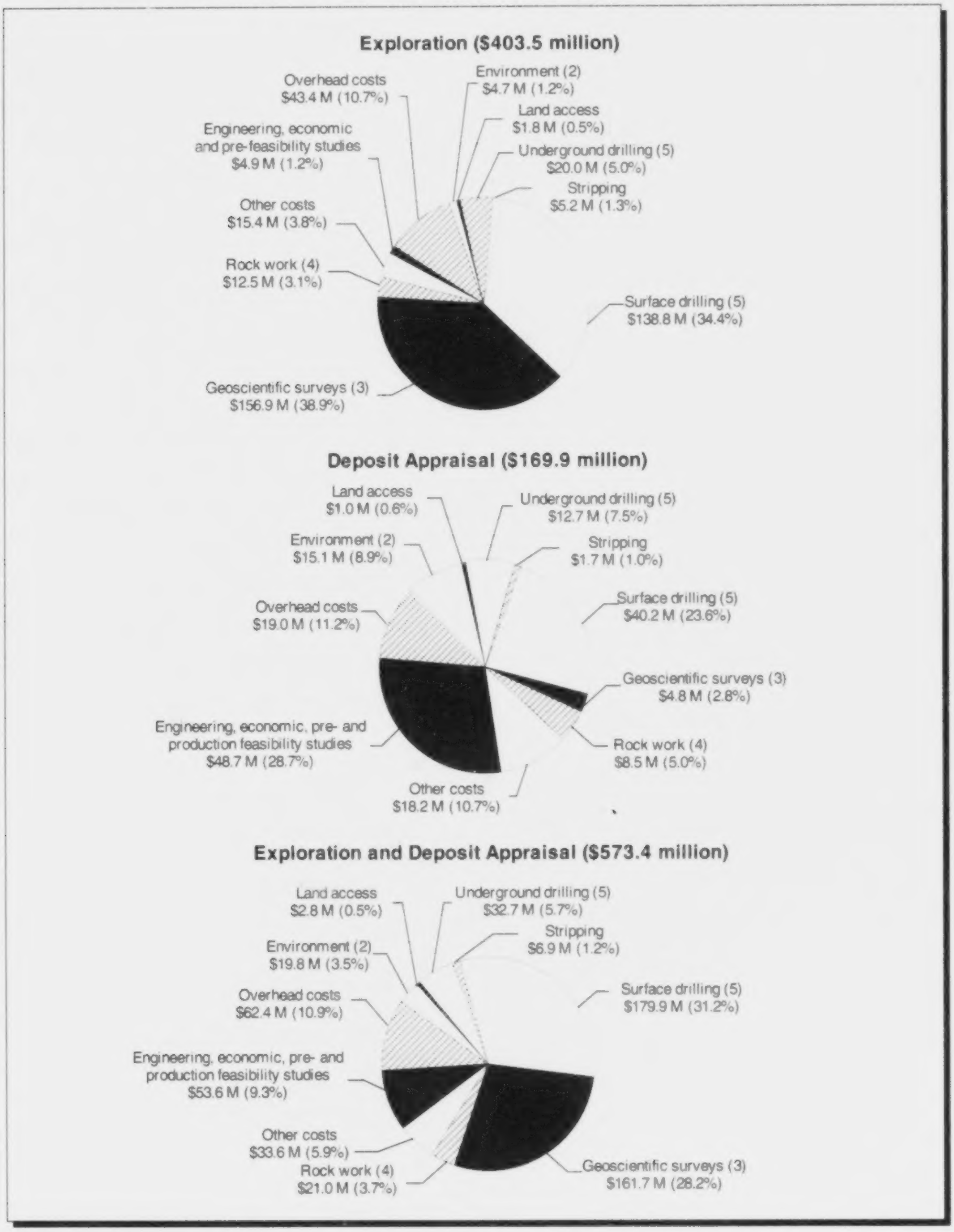
Usually, land access costs (which include costs incurred for impact benefit and socio-economic agreements, rights of way, damages and permits) only account for a small fraction of total exploration and deposit appraisal expenditures (0.6% in 1998, 1.4% in 1999, 0.9% in 2000, 1.1% in 2001 and 0.5% in 2002). However, expenditures for economic, engineering and feasibility studies are more significant. In aggregate, these costs represented 7% ($45 million) of total exploration and deposit appraisal expenditures in 1998, 8% ($41 million) in 1999, 5% ($25 million) in 2000 and 6% ($29 million) in 2001. This type of spending almost doubled in 2002 when $54 million or 9.3% of total spending was dedicated to such studies.

1.3.1.4 Spending by Type of Company

The analyses within this report often distinguish between senior and junior companies. In general terms, a senior company derives its income from mining or other business ventures and can direct part of that income towards its exploration and deposit appraisal projects. Junior companies, on the other hand, usually have no regular source of income and must finance their projects through the issuance of shares.

In 2002, 93 senior project operators accounted for 67% ($383 million) of all exploration and deposit appraisal expenditures in Canada (**Figures 1** and **2**). About 60% of total senior spending was allocated to exploration activities with the remaining 40% going to deposit appraisal work (**Figure 5**). The number of senior project operators was higher in 2001 but their proportion of total spending was slightly lower as the 110 senior project operators reported 65% ($335 million) of total spending for

Figure 7
Exploration and Deposit Appraisal Expenditures in Canada, (1) by Type of Work, 2002



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Includes on-mine-site and off-mine-site activities. (2) Environment includes characterization, permitting, protection, monitoring and restoration. (3) Geoscientific surveys include geology, geochemistry, ground geophysics and airborne geophysics. (4) Rock work activity includes shaft work, drifts, cross-cuts, raises, declines, rock sampling and dewatering costs. (5) Surface and underground drilling includes diamond and other types of drilling.
Notes: Numbers may not add to totals due to rounding. Data for 2002 are final.

TABLE 3. EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES IN CANADA,[1] 2001 AND 2002

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
					($000)					
Field work and overhead (2)	373 853	392 105	96 204	105 121	470 057	497 226	742 401	726 026	1 212 459	1 223 251
Engineering, economic and pre- or production feasibility studies	1 573	4 874	27 114	48 739	28 687	53 612	24 389	11 172	53 076	64 784
Environment	3 134	4 731	5 204	15 052	8 338	19 783	57 872	73 796	66 210	93 579
Land access	2 612	1 836	3 175	964	5 787	2 800	4 816	51 891	10 603	54 691
Subtotal	381 173	403 545	131 697	169 876	512 869	573 421	829 478	862 885	1 342 347	1 436 305
Off-mine-site (3)	338 876	347 137	102 524	146 012	441 400	493 149	n.a.	n.a.	441 400	n.a.
On-mine-site (3)	42 297	56 408	29 173	23 863	71 469	80 272	829 478	862 885	900 948	1 436 305
Capital (4)	7 582	10 283	1 891	21 101	9 473	31 383	1 766 057	1 260 130	1 775 530	1 291 513
$ for environmental protection and restoration (5)	–	–	–	–	–	–	26 324	56 124	26 324	56 124
Total	388 755	413 827	133 588	190 977	522 342	604 804	2 595 535	2 123 015	3 117 877	2 727 819
Repair and maintenance (4)	1 651	9 372	2 092	4 349	3 742	13 721	1 523 963	1 474 580	1 527 705	1 488 301
$ for environmental protection and restoration (5)	–	100	–	3	–	103	33 239	29 012	33 239	29 115
Grand total	390 405	423 200	135 679	195 326	526 085	618 525	4 119 498	3 597 594	4 645 582	4 216 120
Total environment	3 134	4 831	5 204	15 055	8 338	19 886	117 434	158 931	125 773	178 817
Environment as a percentage of grand total	0.8	1.1	3.8	7.7	1.6	3.2	2.9	4.4	2.7	4.2

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

– Nil; n.a. Not applicable.

(1) Includes on-mine-site plus off-mine-site activities; exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves. (2) Overhead expenditures include mineral leases, claims and property taxes, and project-related head office expenditures. (3) Amount of exploration and deposit appraisal expenditures dedicated to off-mine-site and on-mine-site activities. (4) Includes construction, and machinery and equipment expenditures. (5) As part of capital expenditures or repair and maintenance expenditures.

Notes: Numbers may not add to totals due to rounding. Data for 2001 and 2002 are final.

that year. The higher spending in 2002 by a smaller number of senior project operators is primarily explained by companies that spent more than $10 million and between $1 million and $5 million (**Table 1**). In the more than $10 million interval, the addition of one single company had a significant impact considering that companies that fell within that category spent, on average, more than $20 million in both 2001 and 2002. In the $1 million-$5 million spending range, there was a 35% increase in the average amount spent per company from 2001 to 2002.

About 60% ($228 million) of the expenditures reported by senior firms in 2002 were incurred in Ontario, Québec and the Northwest Territories (in decreasing order) (**Figure 2**). Senior company expenditures exceeded 75% of total expenditures in each of Saskatchewan, Manitoba, the Northwest Territories, and Newfoundland and Labrador (in decreasing order). They only amounted to 4% of total exploration and deposit appraisal spending in New Brunswick, 5% in Nova Scotia and 13% in the Yukon.

The number of junior project operators increased to 493 in 2002, up by 11% from the 443 recorded in 2001 (**Figure 1** and **Table 1**). Altogether, these junior companies and prospectors spent $191 million on exploration and deposit appraisal in 2002, an increase in junior spending of 7% over 2001. This 7% increase follows a 14% increase in junior spending recorded between 2000 and 2001 and a 10% increase between 1999 and 2000. One factor that explains this rising trend in junior spending is the introduction in recent years of federal and provincial/territorial incentives aimed at encouraging grass-roots exploration.

Junior spending increased the most in Ontario (+$11 million) and British Columbia (+$10 million). Ontario had by far the largest amount of junior spending expenditures in 2002 with $51 million, followed by Québec ($32 million), Nunavut ($32 million) and British Columbia ($28 million) (**Figure 2**). Of the five provinces/territories that experienced drops in junior exploration spending in 2002, Nunavut was the worst off with a decline of $8 million but still managed to amass a very respectable $32 million in junior spending. When added to the totals of Ontario, Québec and British Columbia, these four jurisdictions accounted for three quarters of all junior spending in Canada in 2002.

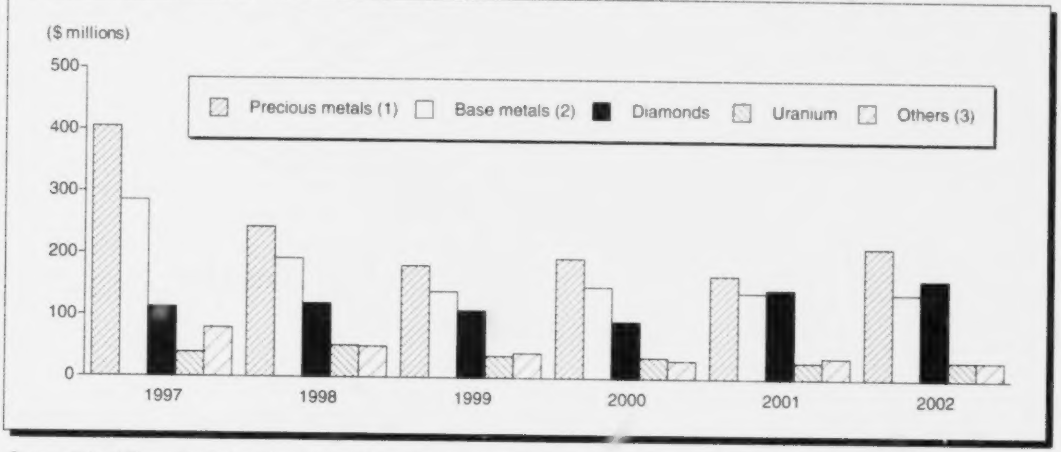
In 2002, junior company spending most frequently fell in the $200 000-$500 000 and $100 000-$200 000 intervals (**Table 1**). Companies spending less than $50 000 are not considered here as their average spending of $20 000 does not translate into many significant exploration projects. As for senior companies that did explore actively in 2002, the most commonly reported range of exploration and deposit appraisal expenditures was $1 million-$5 million. For junior companies, most of the spending was accounted for by project operators spending more than $1 million while, for senior companies, it was the projects worth $10 million or more that had the most impact on total spending.

1.3.1.5 Spending by Type of Commodity Sought

The survey provides a breakdown of exploration and deposit appraisal spending statistics by type of commodity sought. **Figure 8** shows such a breakdown for the groups of commodities or individual commodities most explored for in Canada: precious metals, base metals, diamonds, uranium and "others."

As a result of declining metal prices, exploration and deposit appraisal spending for the two main commodity groups, precious metals (mostly gold) and base metals, decreased significantly between 1997 and 2001. Precious-metal spending dropped from $405 million in 1997 to $167 million in 2001 while base-metal spending decreased from $286 million to $139 million over the same period (**Figure 9**). In 2002, precious-metal expenditures recovered somewhat by increasing to $213 million, a 27% increase compared to the 2001 level. Base-metal spending remained constant at $139 million.

Figure 8
Exploration and Deposit Appraisal Expenditures in Canada, by Commodity Sought, 1997-2002



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

(1) Includes gold, silver and platinum group metals. (2) Includes copper, nickel, lead and zinc. (3) Includes ferrous metals, other metals, nonmetals (including coal), and "not specified."

Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2002 are final.

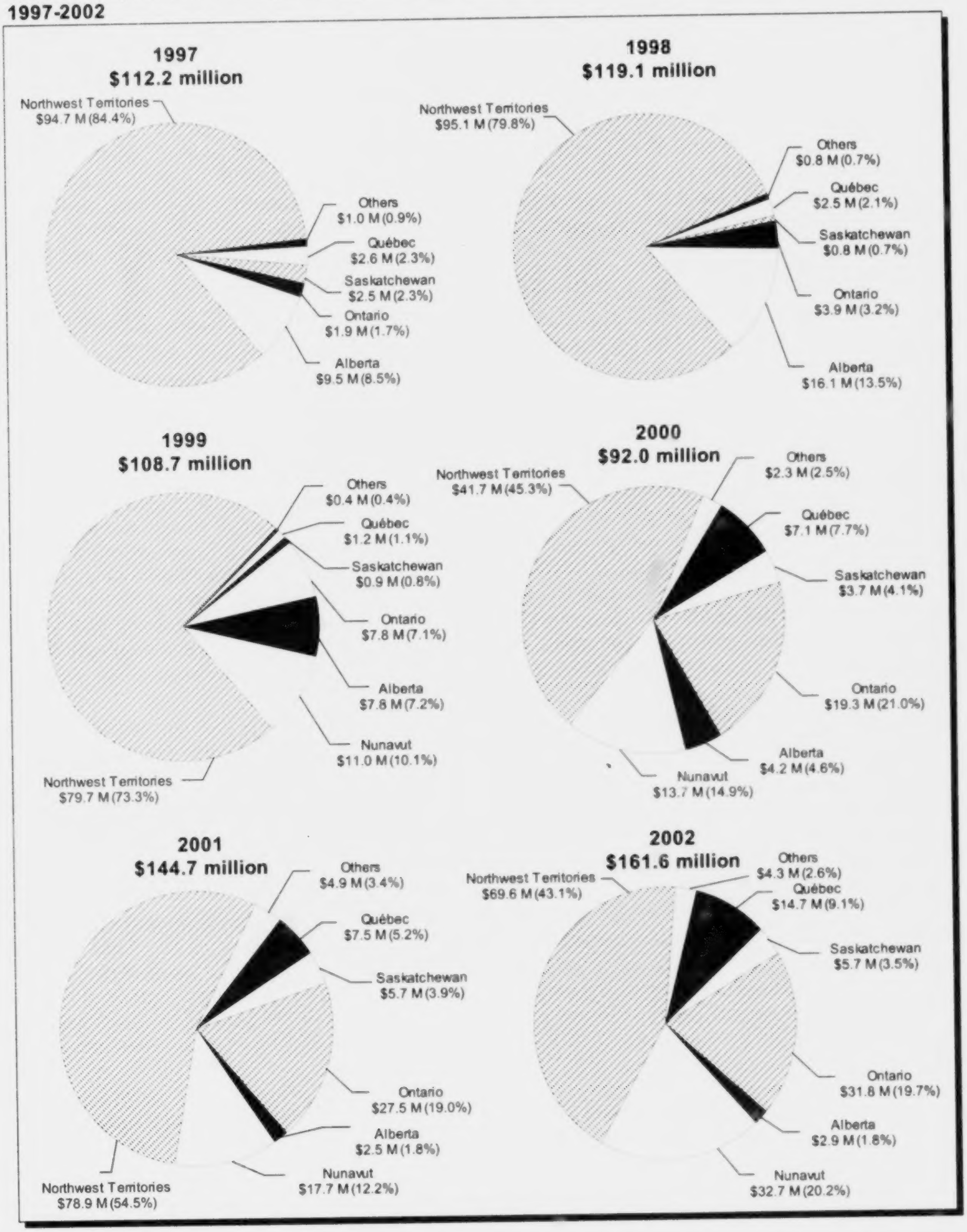
For the second year in a row, the search for diamonds outpaced that for base metals with expenditures of $162 million. In the last decade (since 1994), close to $1.5 billion has been invested in exploration and deposit appraisal activities aimed at discovering diamonds in Canada. Considerably more has been invested in mine development and mine complex development, and the outlook for this sector of the Canadian mining industry points to further investments in all stages of the mineral development cycle.

In 2002, the Northwest Territories was once again the recipient of most of the diamond exploration and deposit appraisal funds as $70 million was spent in that territory. Nunavut ($33 million) and Québec ($15 million) both experienced sizeable gains in diamond spending as their respective expenditures for that commodity almost doubled compared to 2001. Ontario saw its diamond expenditures rise by $4 million to $32 million while Saskatchewan ($6 million) and Alberta ($3 million) recorded levels of spending that were similar to the preceding year.

Table 4 combines information on both the types of companies conducting exploration and deposit appraisal activities and the types of commodities sought by these companies. In 2001, diamonds were the senior companies' favourite target with $106 million in expenditures. Base metals were second with $95 million and precious metals, reflecting an unattractive gold price, came in third with $90 million. Senior companies re-adjusted their spending priorities in 2002 as $122 million was spent on the search for precious metals, followed by diamonds with $120 million and base metals with $99 million.

As for junior companies and prospectors, they showed a marked preference for precious-metals exploration in both 2001 and 2002 with 43% ($76 million) and 48% ($91 million) of their respective total 2001 and 2002 exploration and deposit appraisal expenditures dedicated to the search for gold and platinum group metals (PGMs). Base metals and diamonds both attracted considerably less expenditures from the junior sector but these companies were nevertheless actively involved in their search, splitting almost evenly approximately $80 million on these commodity groups in both 2001 and 2002.

Figure 9
Diamond Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 1997-2002



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Numbers may not add to totals due to rounding. Data for 2002 are final.

TABLE 4. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA,(1) BY TYPE OF COMPANY AND MINERAL COMMODITY, 2001 AND 2002

Type of Company	Base Metals	Precious Metals	Uranium	Diamonds	Others	Total
			($000)			
2001						
Junior companies and prospectors	44 293	76 440	1 973	39 141	15 885	177 733
Senior companies	95 150	90 482	25 116	105 555	18 833	335 136
Total	139 443	166 922	27 089	144 697	34 719	512 869
2002						
Junior companies and prospectors	40 087	91 126	1 837	41 726	16 017	190 793
Senior companies	98 761	121 671	28 234	119 918	14 044	382 628
Total	138 848	212 797	30 071	161 645	30 060	573 421

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

(1) Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs.

Notes: Numbers may not add to totals due to rounding. Data for 2001 and 2002 are final.

1.3.2 2003 Exploration and Deposit Appraisal Expenditures

1.3.2.1 Statistical Summary

As explained in the opening paragraphs of this chapter, company spending intentions for 2003 were compiled in January 2003 and revised in August of the same year. While this approach yields more timely forecasts of exploration and deposit appraisal expenditures, it also results in a less detailed forecast survey exercise. For instance, data on spending by type of commodity and by type of work are not available in the 2003 revised forecast results. They will only be available when the final survey results for 2003 are released in the first quarter of 2004.

Company spending intentions, compiled in January 2003 and revised in August 2003, reveal that 624 companies (project operators) and some prospectors intended to spend some $684 million in 2003 on exploration and deposit appraisal in Canada (**Figures 1** and **2**). That number of companies represents a 6% increase from the 2002 total of 586 companies (expenditures of $573 million). A total of 123 companies (89 in 2002) each intended to spend more than $1 million (**Table 1**). These 123 companies expected to spend a total of $574 million, or 84% of total intended expenditures for 2003.

This third consecutive increase in the number of project operators, from the 2000 low of 541 companies, was mostly reflected in the increased number of companies spending between $200 000 and $5 000 000. Coupled with a decline in the number of companies spending less than $200 000, this resulted in an overall average spending per project that was up by 12% (+$118 000).

Junior companies were mostly responsible for this situation. For instance, in 2003, a total of 112 junior companies fell in the $200 000-$500 000 range, 74 in the $500 000-$1 million range and 71 in the $1 million-$5 million range compared to respective totals for the same spending intervals of 89, 48 and 40 in 2002. These numbers reflect a junior company sector that is involved in more significant projects and appears to have better access to financing. The latter can probably be explained by improved incentive levels at both the federal and provincial levels, by a more receptive investment community, and by a more encouraging outlook for metal prices.

The 2003 forecast total of $684 million confirms that the better performance ($573 million) that was recorded in 2002 was not an isolated event. It is becoming clearer that Canadian exploration and deposit appraisal expenditure levels are now on an upward trend and early indications call for a positive outlook for 2004. Exploration and deposit appraisal spending is expected to continue to be buoyed by recovering metal prices, the ever-expanding search for diamonds, increased levels of flow-through share financings, and increased investor interest.

More than 60% of the total intended exploration and deposit appraisal expenditures for 2003 were reported, in decreasing order, by Ontario, Québec and Nunavut (**Figure 2** and **Table 2**). Increases in expenditures totalling $151 million are expected in eight provinces/territories. Ontario is expected to experience the largest increase, by far, with a resounding $74 million jump in expenditures. British Columbia (+$33 million), Québec (+$12 million), Saskatchewan (+$11 million) and the Yukon (+$11 million) will follow suit. The anticipated improvements in British Columbia and the Yukon will be welcome as these two jurisdictions had suffered severe slow-downs in exploration and deposit appraisal activity in recent years.

Newfoundland and Labrador (-$21 million) and the Northwest Territories (-$17 million) are expected to account for most (94%) of the $40 million total decline that will be recorded in the four remaining provinces/territories. While the losses anticipated for New Brunswick and Alberta will be small in comparison to those mentioned above, they will nevertheless represent a significant decrease in activity for these two provinces.

Company spending intentions indicate that off-mine-site exploration and deposit appraisal expenditures are expected to increase by about 17% with spending of $577 million in 2003 compared to $493 million in 2002 (**Figure 3**). Ontario (+$66 million), British Columbia (+$18 million) and Québec (+$13 million) will experience the most significant increases for that type of spending (**Figure 4**).

Overall, off-mine-site spending is expected to account for 84% of total exploration and deposit appraisal expenditures in 2003. Although this percentage will undoubtedly reassure those that, just a few years ago, were concerned with the deterioration of Canada's grass-roots and off-mine-site exploration effort, it is now on-mine-site spending and declining ore reserve levels[3] at producing metal mines that are becoming a concern. These concerns will be addressed somewhat in 2004 and beyond if the current price outlook for gold and nickel, but also for copper, zinc and lead, remains as positive as it was at press time (see Section 1.6). However, the strength of the Canadian dollar relative to the U.S. dollar will remain an important consideration in determining how much effect rising prices will actually have on the financial performance of Canadian producers.

Reflecting the already improved context, on-mine-site exploration and deposit appraisal spending is expected to show some improvement in 2003, increasing by 34% to reach $107 million. While this amount is still far below the $168 million that was spent for on-mine-site activities back in 1997, this increase is promising. After four years of improving off-mine-site spending, 2003 may represent the year that on-mine-site expenditures finally start to turn the corner towards improved sustainability of existing mines by increasing ore reserve levels. Ontario ($40 million), Québec ($31 million) and British Columbia ($17 million) are clearly the provinces where the most on-mine-site spending will be incurred. For 2003, these three provinces are expected to account for 82% of all on-mine-site exploration and deposit appraisal expenditures in Canada.

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[3] For a discussion on the state of Canada's ore reserves, see Alan Reed, "Canadian Reserves of Selected Major Metals, and Recent Production Decisions," in the 2002 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa.

1.3.2.2 Spending by Work Phase

Company spending intentions indicate that expenditures dedicated to exploration activities will increase by 29% to $521 million (**Figure 10**). This amount represents 76% of total intended exploration and deposit appraisal expenditures for that year. Of this $521 million total, $459 million (88%) will be incurred off mine sites (**Figure 3**).

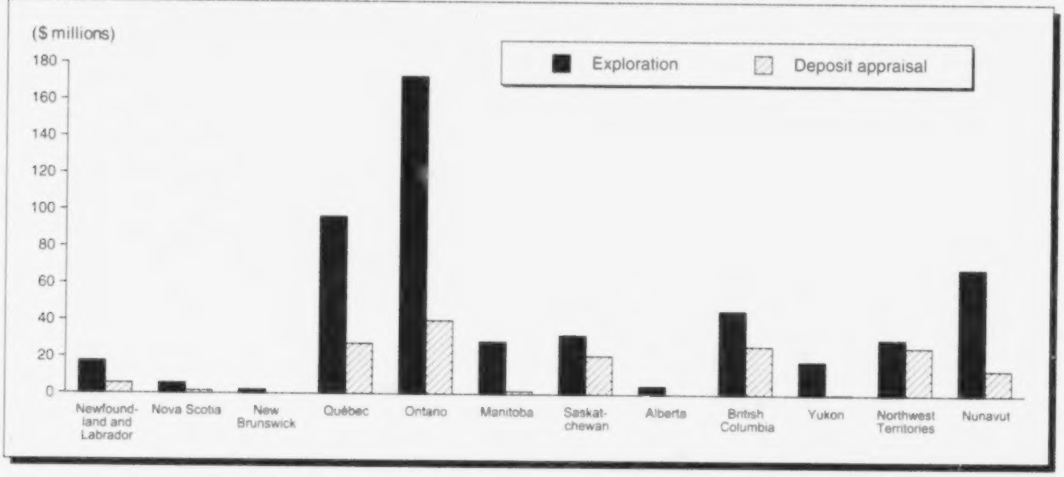
Deposit appraisal spending is expected to amount to $163 million in 2003. At 72% of total deposit appraisal spending, the proportion of off-mine-site deposit appraisal spending leads once again to the conclusion that on-mine-site work needs to be increased. However, it also indicates that the emphasis on off-mine-site projects could lead to the development and opening of new mines, possibly outside of traditional mining camps.

On a provincial/territorial basis, exploration-phase expenditures are expected to once again represent 100% of the combined 2003 exploration and deposit appraisal expenditures in Alberta (**Figure 10**). New Brunswick and the Yukon are also expected to have virtually all of their work recorded under the exploration category. The proportion of exploration work, out of total exploration and deposit appraisal spending, in other provinces/territories is also expected to exceed 80% in Manitoba, Nunavut and Ontario.

In terms of ranking by total exploration expenditures, Ontario is expected to rank first with $173 million, followed by Québec ($96 million) and Nunavut ($69 million). Together, these three provinces/territories should contribute about 65% of total Canadian exploration expenditures.

Ontario will take over from the Northwest Territories in terms of deposit appraisal spending in 2003 with forecast expenditures of $40 million. Québec ($27 million), British Columbia ($26 million), the Northwest Territories ($26 million) and Saskatchewan ($21 million) will also figure prominently among the provinces/territories receiving the most deposit appraisal spending for that year.

Figure 10
Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2003



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2003 are based on revised company intentions compiled in August 2003.

1.3.2.3 Spending by Type of Company

Based on company spending intentions compiled in January 2003 and revised in August 2003, a total of 105 senior project operators expected to spend $404 million in 2003, accounting for 59% of all exploration and deposit appraisal expenditures for that year (**Figures 1** and **2**). About 68% of total spending by seniors was expected to be allocated to exploration activities and the balance to deposit appraisal activities **(Figure 5)**.

In 2002, 93 senior project operators had reported 67% ($383 million) of total exploration and deposit appraisal expenditures in Canada. The increased spending by senior companies is almost entirely explained by an additional two projects in the above $10 million spending interval where a total increase of $26 million is expected (**Table 1**).

More than half (56%) of the expenditures reported by senior firms in 2003 will be incurred in Ontario and Québec (in decreasing order). The large increase (+$60 million) expected in Ontario tends to hide the fact that senior spending will actually decrease in seven provinces/territories. The most severe decreases (in terms of magnitude) are forecast to occur in Newfoundland and Labrador ($24 million) and the Northwest Territories ($20 million).

The number of junior project operators (including prospectors) is expected to rise to 519 in 2003 and surpass the 500 level for the first time since 1998. The number of junior project operators has been increasing steadily since the 2000 low of 424 (**Figure 1**). This increase in the number of junior project operators (from 493 in 2002) will be accompanied by an impressive $90 million (+47%) jump in junior spending. The $281 million in junior company spending expected in 2003 comes very close to the total of $298 million that was reached in 1997, the first year of data for the current survey format (**Figure 2**).

While other factors have also come into play, the availability of the federal Investment Tax Credit for Exploration, starting in October 2000, and of a number of harmonized and non-harmonized provincial/territorial incentive measures appear to have contributed strongly to the revitalization of the Canadian junior mining sector. After dropping from $298 million in 1997 to $141 million in 1999, junior spending started to increase in 2000 ($156 million), the year that the ITCE was introduced, to reach $178 million in 2001 and $191 million in 2002.

Evidence gathered by an Intergovernmental Working Group on the Mineral Industry (IGWG) sub-working group on taxation, and submitted to the 2003 Mines Ministers' Conference[4] in Halifax, Nova Scotia, strongly suggests that most of the junior company spending recorded in Canada since 2000 has indeed been financed by the issuance of flow-through shares, to which tax credits are attached. Data collected by Natural Resources Canada on flow-through share financings for 2003, and particularly for the second half of that year, suggest that junior companies will keep on building on their momentum in 2004. However, it remains to be seen whether the planned termination of the ITCE at the end of 2004 will put a damper on the activities of junior companies.

Another conclusion of the IGWG sub-working group on taxation was that the average size of planned flow-through share offerings has been increasing since the introduction of the ITCE and related tax credits. A breakdown of junior exploration and deposit appraisal expenditures by range of spending tends to confirm this finding. In both 2001 and 2002, junior companies typically spent less than $200 000, although there was a move towards the higher spending intervals in 2002 (**Table 1**). This tendency is expected to continue in 2003 and, this time, junior company spending intentions are predicted to fall mostly between $200 000 and $5 million. In fact, it is expected that half of the total junior spending for that year will be incurred by 71 juniors spending between $1 million and $5 million. Another 74 junior companies will spend between $500 000 and $1 million and 112 junior companies will spend between $200 000 and $500 000. Overall, average spending per junior company will have gone from $401 000 in 2001 to $541 000 in 2003.

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[4] Intergovernmental Working Group on the Mineral Industry, *Taxation Issues Relating to Exploration and the Restructuring of Resource Taxation*, Canadian Mines Ministers' Conference, Halifax, Nova Scotia, September 2003.

Except for spending decreases totalling $1.5 million in New Brunswick and Alberta, junior expenditures are expected to rise everywhere else in Canada for a combined increase of $91 million. The largest increase, in dollar terms, is expected in British Columbia (+$18 million) followed by Nunavut (+$16 million), Québec (+$15 million) and Ontario (+$13 million). In decreasing order of expenditures, Ontario, Nunavut, Québec and British Columbia, as a group, are expected to account for 73% of all junior expenditures in 2003.

1.3.2.4 Statistical Estimation of Exploration and Deposit Appraisal Spending (Based on Field and Overhead Costs Only)

1.3.2.4.1 METHODOLOGY

In this section, an attempt is made to predict the level of exploration and deposit appraisal spending for 2003 using standard statistical estimation techniques. Expenditures are estimated by linking historical exploration and deposit appraisal spending (field and overhead expenditures only) to factors for which historical data are available.

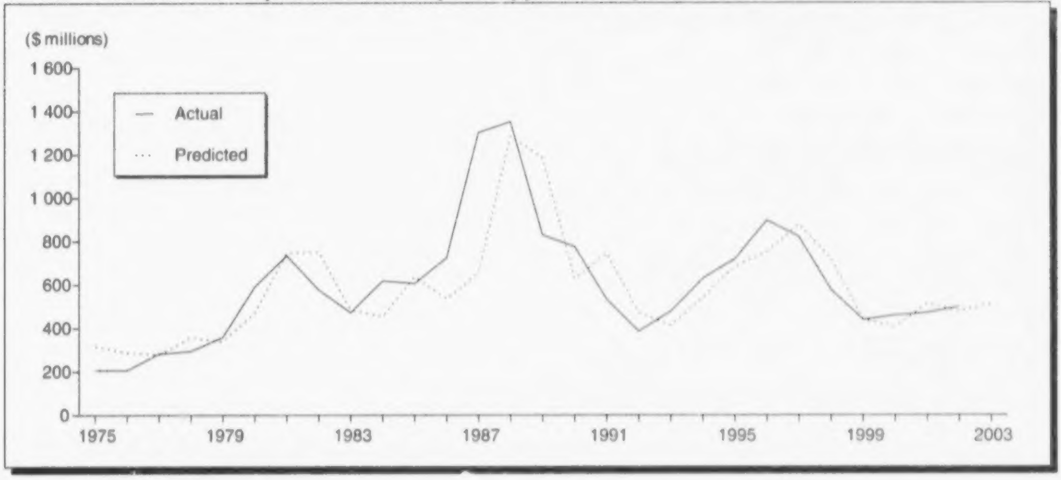
An analysis of historical data indicates that the level of expenditures on mineral exploration and deposit appraisal in a given year can be linked to the previous year's metal prices. This may be because companies view exploration and deposit appraisal as an investment, with expected returns to that investment dependent on expected revenues from the subsequent mining of discovered deposits. Expected future revenues would obviously depend on future mineral and metal prices, and expectations of future prices would likely be influenced by current prices. As well, metal prices influence the level of a mining company's revenues and profits and are an important determinant in the amount of internal funds available for spending on exploration and deposit appraisal.

Changes in spending are likely to lag changes in metal prices because exploration and deposit appraisal activity in a particular year is the result of a budgeting process that takes place in the preceding year. Budget allocations in a given year are therefore likely to reflect the metal prices and company profits of the preceding year.

To capture this relationship between exploration, deposit appraisal and metal prices, the NRCan yearly Metals Price Index, lagged one year, was included in the estimating equation. This index is a Fisher Ideal Index, based on the prices of six metals: gold, silver, copper, zinc, lead and nickel.

Mineral exploration and deposit appraisal is a multi-stage process (see Appendix 2) that usually proceeds over a relatively long period of time as information is gathered from geological mapping, geophysical and geochemical surveying, diamond drilling, and so on. At various stages, this information is used by companies to decide on where to concentrate further activity and, indeed, whether to proceed at all. If early stages of exploration are successful in discovering promising mineralization, the company has a strong incentive to proceed with more detailed, and more costly, drilling and analysis, and to launch a feasibility study, thereby increasing the amount it spends on exploration and deposit appraisal. It can therefore be argued that exploration and deposit appraisal in a given period is related to spending in previous periods. To capture this relationship, a lagged dependent variable was also included in the equation.

Figure 11
Actual and Predicted Exploration and Deposit Appraisal Expenditures in Canada, 1975-2003



Source: Natural Resources Canada.
Note: For comparison with pre-1997 years, the data include only off-mine-site and on-mine-site field and overhead expenditures.

1.3.2.4.2 RESULTS

It is important to remember that the following results are based on an analysis of expenditures that include only field and overhead costs. The new categories of expenditures such as environment, land access, economic, engineering and feasibility studies were excluded for the years for which they are available (1997 onwards) in order to establish a valid comparison. It is also important to remember that diamonds are not included in NRCan's metals price index and that they have accounted for much exploration and deposit appraisal spending in recent years.

Therefore, notwithstanding these caveats and using data for the years 1975-2002, the statistical equation predicts total expenditures of $510 million for 2003 (**Figure 11**). This estimation represents a 3% increase over the $497 million level that was actually recorded in 2002 for field and overhead costs (see **Table 24** in Appendix 1) and would mean a fourth consecutive increase in core spending (field and overhead costs only) since the trough of 1999.

1.4 DRILLING

Drilling activities are an essential component of the mineral development cycle from the anomaly investigation stage to the deposit delineation and deposit definition stages. As such, drilling statistics constitute a valuable indicator of recent levels of Canadian mineral exploration and deposit appraisal activity.

1.4.1 Statistical Sources

Diamond drilling is the most widely used drilling method for determining the existence, location, extent, grade and tonnage of a mineral deposit. Canada harbours an important diamond drilling industry and many of its companies are represented by the Canadian Diamond Drilling Association (CDDA). The CDDA gathers diamond drilling statistics from its members and, although these data do not represent all of the Canadian contract diamond drilling activity, they provide a reasonable and the most up-to-date indication of recent national mineral exploration and deposit appraisal trends.

The yearly drilling statistics compiled by the CDDA are depicted in **Figure 12** along with two other sets of diamond drilling statistics. These are total Canadian contract diamond drilling, as reported annually to Natural Resources Canada by drilling contractors and published in Statistics Canada's catalogue no. 26-201, and diamond drilling data from the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures, which include all metres drilled and expenditures reported by companies for their "own account" (drilling they did themselves) and for contracted drilling work.

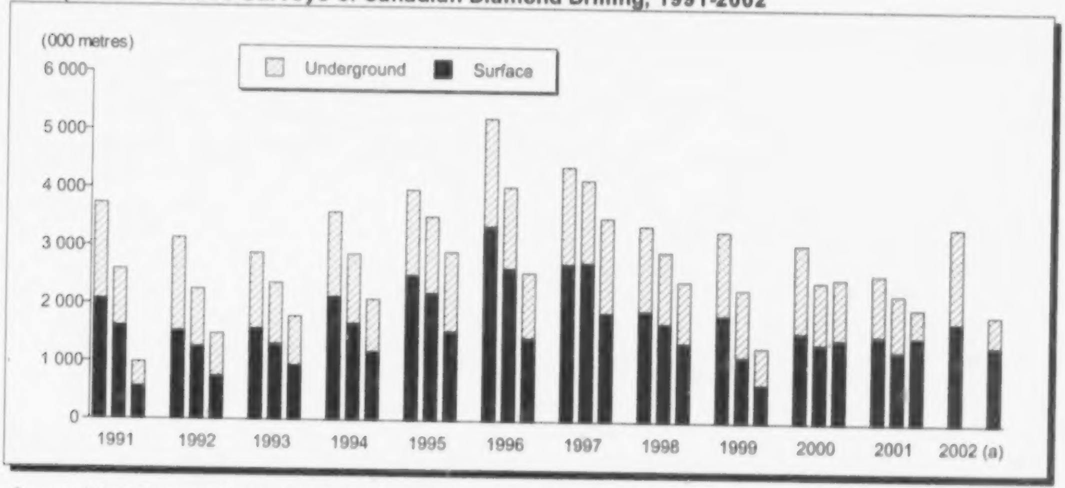
Exceptionally, in this last set of data, exploration drilling and deposit appraisal drilling have been aggregated with mine development drilling to allow a valid comparison with the other two sets of statistics. Mine-site development drilling (mainly underground) consists of drilling aimed at extending ore reserves at producing mines. This type of drilling will not be considered in the rest of the drilling analysis but the reader should be aware that the number of metres drilled for mine development in a given year often exceeds that of total exploration and deposit appraisal drilling.

1.4.1.1 Comparison of Drilling Statistics

Although the three sources of statistics mentioned above provide different annual results, the same overall trends are observable in the three surveys over most of the period 1991-2002.

On an annual basis, the CDDA diamond drilling statistics confirm the trends observed in exploration and deposit appraisal expenditures in recent years. **Figure 12** shows that, after peaking in 1997, the drilling reported to the CDDA declined by 31% in 1998 and by a further 47% between 1998 and 1999. CDDA statistics for 2000 show a complete reversal of the downward trend with a 92% increase over the 1999 level. However, that reversal was short-lived as the number of metres drilled declined by 20% in 2001. This decline can be attributed to a drop in deposit appraisal spending and also to a sharp decline in underground diamond drilling as mine development activities were curtailed as a result of weak metal prices. For 2002, CDDA members saw their overall metres drilled drop by about 6%. This time, reduced surface drilling was responsible for bringing the total down. On a longer time horizon, the CDDA surface diamond drilling statistics compare relatively well with those of the past 11 years while underground drilling has clearly seen better days.

Figure 12
Comparison of Three Surveys of Canadian Diamond Drilling, 1991-2002



Sources: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (left bar in each cluster); contract diamond drilling survey (middle bar in each cluster); Canadian Diamond Drilling Association (CDDA) (right bar in each cluster).

(a) Contract diamond data for 2002 were not yet available at press time.

Note: All data include exploration, deposit appraisal and mine development drilling.

1.4.2 Drilling by Work Phase

According to the federal-provincial/territorial survey, a total of 2 418 000 m of surface and underground drilling (including diamond drilling and other drilling methods) was carried out for exploration and deposit appraisal purposes in Canada in 2002, compared to 1 766 000 m in 2001 (**Tables 5** and **6**). Of this, 2 306 000 m were accounted for by diamond drilling, up by 37% from the 1 679 000 m drilled in 2001.

Some 80% (1 929 000 m) of the total drilling activity in 2002 was dedicated to the exploration phase while the remaining 20% (488 000 m) was dedicated to deposit appraisal work. In terms of provincial/territorial rankings, Ontario and Québec dominated exploration-phase drilling with a combined 64% of the total metres drilled for that year. These two provinces also accounted for 73% of all deposit appraisal drilling.

1.4.3 Drilling by Type of Company

Senior companies accounted for 70% (1 697 000 m) of all surface and underground drilling (including diamond drilling and other drilling methods) in the exploration and deposit appraisal phases in 2002 (**Table 7**).

In terms of surface and underground drilling, senior companies accounted for virtually all of the underground drilling in each of the two work phases. Surface drilling activity was more evenly divided as seniors accounted for 57% (958 000 m) of the total compared to 43% (712 000 m) for junior companies. For junior companies, the 712 000-m total represented a 9% increase from the 2001 level of 653 000 m, marking another year of improvement for drilling by this type of company. As for senior companies, they saw both their surface and underground drilling activity increase in 2002 by 29% and 101%, respectively.

TABLE 5. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING IN CANADA,(1) BY PROVINCE AND TERRITORY, 2001 AND 2002

	Surface Drilling			Underground Drilling			Total Drilling		
Province/Territory	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total
					(000 m)				
2001									
Newfoundland and Labrador	41.0	6.9	47.8	0.4	–	0.4	41.4	6.9	48.2
Nova Scotia	4.5	0.6	5.1	–	–	–	4.5	0.6	5.1
New Brunswick	52.4	–	52.4	–	10.0	10.0	52.4	10.0	62.4
Québec	294.6	36.6	331.2	51.2	114.5	165.7	345.8	151.1	496.9
Ontario	361.5	24.7	386.2	68.7	35.8	104.5	430.2	60.4	490.7
Manitoba	67.8	2.5	70.3	34.7	31.9	66.6	102.5	34.4	136.9
Saskatchewan	97.6	–	97.6	1.9	–	1.9	99.4	–	99.4
Alberta	18.8	–	18.8	19.6	–	19.6	38.4	–	38.4
British Columbia	182.4	21.3	203.6	–	–	–	182.4	21.3	203.6
Yukon	12.5	–	12.5	–	–	–	12.5	–	12.5
Northwest Territories	33.7	20.0	53.7	–	2.0	2.0	33.7	22.0	55.7
Nunavut	96.2	18.3	114.5	1.8	–	1.8	98.0	18.3	116.3
Total	1 263.0	130.8	1 393.8	178.3	194.2	372.4	1 441.2	325.0	1 766.2
2002									
Newfoundland and Labrador	56.1	9.6	65.7	0.4	–	0.4	56.5	9.6	66.1
Nova Scotia	5.4	–	5.4	–	–	–	5.4	–	5.4
New Brunswick	20.9	–	20.9	–	–	–	20.9	–	20.9
Québec	294.6	75.0	369.5	192.2	179.7	371.8	486.7	254.6	741.4
Ontario	536.7	49.1	585.8	211.6	51.6	263.1	748.3	100.6	848.9
Manitoba	69.3	–	69.3	60.6	42.4	103.0	129.9	42.4	172.3
Saskatchewan	113.7	–	113.7	4.9	–	4.9	118.6	–	118.6
Alberta	86.5	–	86.5	–	–	–	86.5	–	86.5
British Columbia	170.2	24.7	194.9	0.5	–	0.5	170.7	24.7	195.4
Yukon	8.8	–	8.8	2.5	–	2.5	11.3	–	11.3
Northwest Territories	23.7	21.5	45.2	–	–	–	23.7	21.5	45.2
Nunavut	69.4	34.9	104.4	1.3	–	1.3	70.7	34.9	105.7
Total	1 455.1	214.8	1 669.9	473.9	273.6	747.6	1 929.1	488.4	2 417.5

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
– Nil.
(1) Includes diamond drilling and other drilling methods such as rotary and percussion.
Note: Numbers may not add to totals due to rounding.

TABLE 6. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING IN CANADA, 1985-2002

	Diamond Drilling			Other Drilling (1)		
	Metres Drilled			Metres Drilled		
Year	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total
			(000 m)			
1985	..	..	2 531	..	..	270
1986	..	..	3 616	..	..	55
1987	..	..	6 221	..	..	262
1988	..	..	6 206	..	..	211
1989	..	..	3 940	..	..	297
1990	..	..	3 702	..	..	241
1991	..	..	2 341	..	..	234
1992	..	..	1 889	..	..	139
1993	..	..	1 932	..	..	282
1994	..	..	2 626	..	..	213
1995	..	..	2 993	..	..	280
1996	..	..	3 898	..	..	169
1997 (a)	2 670	734	3 404	157	239	396
1998	2 024	433	2 458	58	82	140
1999	1 693	583	2 277	62	127	189
2000	1 490	559	2 049	22	9	31
2001	1 359	321	1 679	83	4	87
2002	1 830	476	2 306	99	13	112

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

.. Not available.

(a) The exploration and deposit appraisal phases were adopted as part of the survey redesign in 1997.

(1) Other drilling methods include rotary and percussion.

TABLE 7. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING (1) IN CANADA, BY TYPE OF COMPANY, 2001 AND 2002

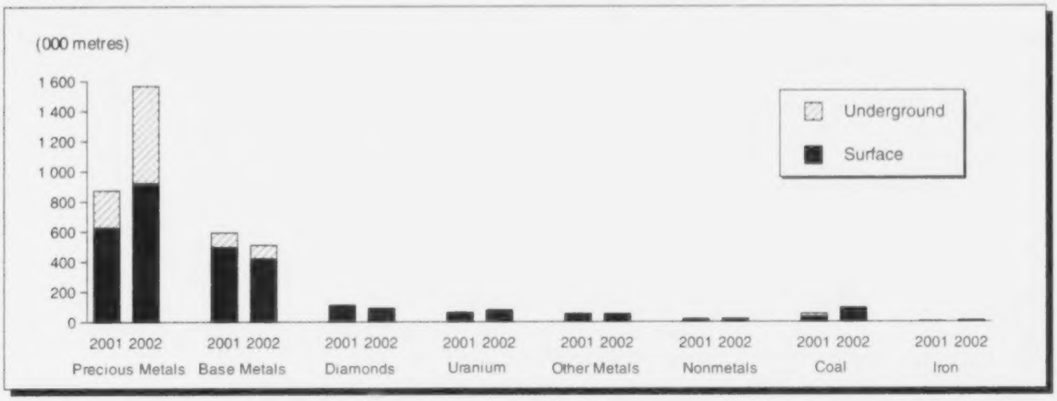
Type of Company	Exploration Drilling	Deposit Appraisal Drilling	Total by Type of Company
		(000 m)	
2001			
Junior companies			
Surface	599.3	54.1	653.4
Underground	3.9	–	3.9
Subtotal	603.2	54.1	657.3
Senior companies			
Surface	663.6	76.7	740.3
Underground	174.4	194.2	368.6
Subtotal	838.0	270.9	1 108.9
Total	1 441.2	325.0	1 766.2
2002			
Junior companies			
Surface	659.7	52.4	712.2
Underground	8.2	–	8.2
Subtotal	667.9	52.4	720.4
Senior companies			
Surface	795.4	162.4	957.8
Underground	465.7	273.6	739.4
Subtotal	1 261.2	436.0	1 697.1
Total	1 929.1	488.4	2 417.5

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

– Nil.

(1) Includes diamond drilling and other drilling methods such as rotary and percussion.

Figure 13
Surface and Underground Exploration and Deposit Appraisal Drilling (1) in Canada, by Commodity, 2001 and 2002



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Includes diamond drilling and other drilling methods such as rotary and percussion.

Exploration drilling by senior companies was mostly conducted from the surface while their deposit appraisal drilling mostly took place underground. As can be expected, the drilling activities of junior companies were almost exclusively focused on surface exploration and deposit appraisal.

1.4.4 Drilling by Type of Commodity Sought

In terms of total surface and underground drilling (including diamond drilling and other drilling methods) by group of commodity sought, **Figure 13** shows that exploration and deposit appraisal drilling activities in Canada in 2001 and 2002 were primarily aimed at the discovery of precious metals and base metals. In 2002, a total of 1 567 000 m was drilled in the search for precious metals, representing 65% of total exploration and deposit appraisal drilling. Of this total, 920 000 m (59%) were drilled from the surface. Drilling for base metals accounted for 21% (510 000 m) of total exploration and deposit appraisal drilling and, once again, surface drilling was more prevalent with 82% (419 000 m) of the drilling aimed at this commodity group. The apparent lack of underground drilling aimed at discovering base metals once again reinforces the concerns over declining reserve levels at existing mines.

Surface drilling also accounted for most of the exploration and deposit appraisal drilling activity aimed at discovering commodities other than precious and base metals in 2002. In fact, it represented all, or almost all, of the drilling conducted within these two phases of activity for the discovery of diamonds, uranium, nonmetals, coal and iron.

1.5 CLAIM STAKING

Claim staking is another useful indicator of exploration activity. It is particularly efficient at rapidly highlighting emerging trends, such as the mid- and late 1990s exploration rush for diamonds, and at pinpointing areas of interest. Because claim staking usually happens at a relatively early stage of the exploration and deposit appraisal process, it also provides a good measure of current grass-roots-type activities and a good insight into where future advanced (deposit appraisal) work could be focused.

Since claim-staking rules and guidelines differ across Canada and have been evolving rapidly with the increased adoption of map staking, the reader is invited to contact the respective provincial/territorial mine recorders for more information on staking activity in a particular jurisdiction (i.e., ground vs. map staking; cost and size of claims, permits and leases; assessment work requirements; etc.).

1.5.1 New Claims Staked

The area of new mineral claims staked in Canada in 2002 (**Table 8**) totalled some 16.9 million hectares (Mha), some 5.8 Mha (52%) more than the area recorded in 2001. The largest area of new mineral claims recorded in a single year in Canada was 44.2 Mha in 1997, followed by 33 Mha in 1992 and 27 Mha in 1993. The totals recorded for both 2001 and 2002 compare favourably to the levels recorded prior to 1992, that is, prior to the major exploration and deposit appraisal efforts that were triggered by the discovery of diamonds in the Northwest Territories and, later, base metals in Labrador.

As opposed to recent years when Alberta had the most influence on the yearly variation in the area of new mineral claims staked in Canada, but almost no influence on actual exploration and deposit appraisal spending, Nunavut was by far the most popular region for new mineral claims in 2002. Along with an additional 3.2 Mha of mineral claims, the territory also saw its expenditures go up by $15 million in 2002 and by another $7 million in 2003. Québec, with a diamond-staking rush in the Otish mountains, also saw its area of new minerals claimed staked rise by 1.2 Mha.

Helped by this increased staking activity, Québec captured the second rank, behind Alberta and ahead of Nunavut, for the province/territory with the largest area occupied by claims in good standing in 2002 (**Table 9**).

1.5.2 Claims in Good Standing

The total area occupied by claims in good standing amounted to approximately 4.1% of Canada's total landmass in 2002, compared to 3.3% in 2001. This increase of 8.3 Mha is again mostly attributable to Nunavut and Québec, and also to Alberta. Therefore, diamonds continued to be the main driver of claim staking in Canada in 2002.

TABLE 8. AREA OF NEW MINERAL CLAIMS[(1)] STAKED IN CANADA, 2001 AND 2002

Province/Territory	2001		2002	
	(hectares)	(%)	(hectares)	(%)
Newfoundland and Labrador	391 625	3.5	838 150	4.9
Nova Scotia	87 722	0.8	147 713	0.9
New Brunswick	35 712	0.3	33 888	0.2
Québec	2 115 424	19.0	3 290 446	19.5
Ontario	981 904	8.8	813 424	4.8
Manitoba	1 054 106	9.4	1 287 997	7.6
Saskatchewan	558 131	5.0	339 490	2.0
Alberta	4 192 055	37.6	4 670 028	27.6
British Columbia	636 800	5.7	688 500	4.1
Yukon	40 644	0.4	81 872	0.5
Northwest Territories	626 177	5.6	1 099 888	6.5
Nunavut	441 270	4.0	3 623 559	21.4
Total	11 161 570	100.0	16 914 955	100.0

Source: Provincial and territorial mining recorders.

(1) Excludes coal.

TABLE 9. AREA OCCUPIED BY CLAIMS IN GOOD STANDING IN CANADA, 2001 AND 2002

Province/Territory	Total Area	Area of Claims in Good Standing	Area of Claims/ Total Area
	(hectares)		(%)
2001			
Newfoundland and Labrador	40 572 000	1 150 379	2.8
Nova Scotia	5 549 000	124 930	2.3
New Brunswick	7 344 000	228 016	3.1
Québec	154 068 000	4 681 819	3.0
Ontario	106 858 000	2 950 928	2.8
Manitoba	64 995 000	3 514 878	5.4
Saskatchewan	65 233 000	2 368 499	3.6
Alberta	66 119 000	8 264 028	12.5
British Columbia	94 931 000	3 306 200	3.5
Yukon	48 345 000	986 519	2.0
Northwest Territories	143 232 000	3 229 957	2.3
Nunavut	199 400 000	2 101 425	1.1
Total Canada	996 646 000	32 907 578	3.3
2002			
Newfoundland and Labrador	40 572 000	1 638 959	4.0
Nova Scotia	5 549 000	186 354	3.4
New Brunswick	7 344 000	210 656	2.9
Québec	154 068 000	6 767 500	4.4
Ontario	106 858 000	2 881 168	2.7
Manitoba	64 995 000	2 464 233	3.8
Saskatchewan	65 233 000	2 287 597	3.5
Alberta	66 119 000	11 207 245	17.0
British Columbia	94 931 000	3 369 400	3.5
Yukon	48 345 000	887 221	1.8
Northwest Territories	143 232 000	3 687 073	2.6
Nunavut	199 400 000	5 581 181	2.8
Total Canada	996 646 000	41 168 587	4.1

Sources: Natural Resources Canada; provincial/territorial mining recorders.
Note: Data for Prince Edward Island are excluded.

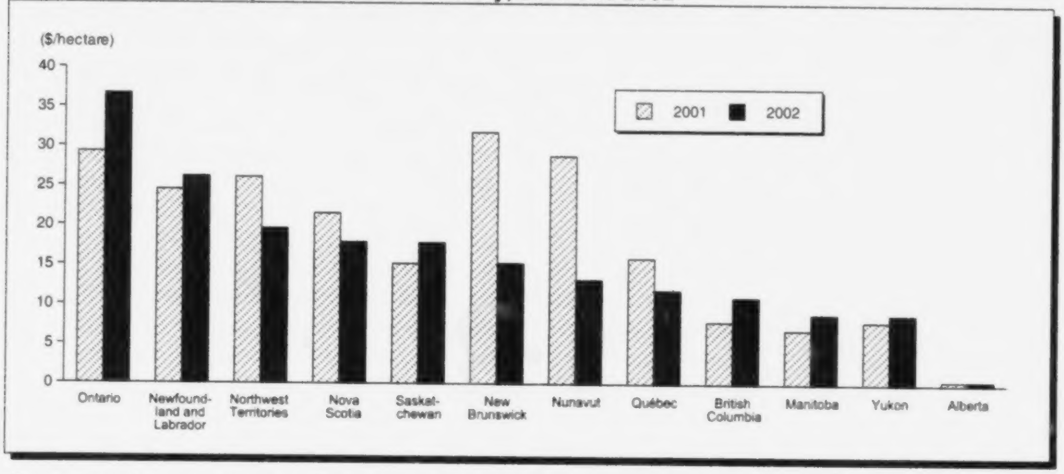
In 2002, spending per hectare of claims in good standing ranged between $0.46/ha in Alberta and $36.68/ha in Ontario (**Figure 14**). This considerable variation is often explained by the type of staking (ground vs. map) and the size of the claims or permits rather than by the actual intensity of exploration (more advanced vs. reconnaissance-type of work) in a given province/territory. However, in this case, it is clear that Ontario is the Canadian leader in exploration and deposit appraisal spending and that companies appear to be looking seriously at the ground positions that they hold in this province. For Canada as a whole, exploration and deposit appraisal spending (off-mine-site) amounted to an average of $11.98/ha of claims in good standing.

1.6 SHORT-TERM OUTLOOK FOR METAL PRICES

Metal prices are extremely cyclical and for the past several years the mining industry has been struggling with historically low prices for many major metals. As shown by NRCan's Monthly Metals Price Index (**Table 25** in Appendix 1), prices generally followed a downward trend throughout the 1990s. In October 2001, the index hit its lowest level since 1987, with prices for some metals, such as copper and zinc, hitting 14-year lows.

During 2003, metal prices improved substantially in U.S. dollar terms, with most of the increases in the latter half of the year. Booming economic growth and demand for metals in China, the weakening of the U.S. dollar, and supply constraints for some commodities were some of the factors in

Figure 14
Off-Mine-Site Exploration and Deposit Appraisal Expenditures Per Hectare of Claims in Good Standing in Canada, by Province and Territory, 2001 and 2002



Sources: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures; provincial/territorial mining recorder offices.
Notes: Off-mine-site exploration and deposit appraisal expenditures include costs incurred off-mine-site for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. "Claims in good standing" excludes mining leases. Data for 2001 and 2002 are final.

this recovery. Nickel led the way with the monthly average for December 2003 at US$6.43/lb, up nearly 100% over the December 2002 average. During the same period, the monthly average lead price rose by 56% to US33.5¢/lb, monthly average copper prices increased 38% to US$1.00/lb, and zinc prices rose 23% to a December 2003 monthly average of US45.7¢/lb.

In gold, the December 2003 monthly average was nearly 25% higher than for the same 2002 period, and the average price for January 2004 was still higher, at US$414/oz, the highest monthly average since February 1990. The strengthening of the gold price has been attributed to such events as the Iraq war, SARS, and the weakening of the U.S. dollar. Low interest rates in the United States and a record U.S. current account deficit will likely continue to keep the U.S. dollar weak, at least in the short term. This, together with reduced central bank gold sales, less producer hedging and the recent liberalization of gold markets in China, South Korea, Vietnam and India, should help to keep upward pressure on the price of gold.[5]

Since much of these recent price increases have been as a result of the weakening U.S. dollar, metal prices denominated in currencies that have appreciated against the U.S. dollar, such as the Canadian dollar, show somewhat smaller improvements. This is particularly true for the prices of zinc and gold, which only increased marginally during 2003 in Canadian dollar terms.

1.7 TAX INCENTIVES AND RECOVERING MINERAL EXPLORATION EXPENDITURES

The recent downturn in exploration and deposit appraisal spending, which began in 1997 and bottomed out in 2000, led to a considerable weakening of Canada's famed junior mining sector, to a significant reduction in the country's reserves of gold and base metals, and to consequent mine closures and job losses. In response to demands for help from affected stakeholders (mining industry, communities, provinces/territories), the federal government introduced the Investment Tax Credit for Exploration (ITCE) in October 2000. This three-year, 15% non-refundable federal tax credit, available only to investors in flow-through shares of exploration and mining companies, was later extended to the end of 2004. This extension was granted following a recommendation from Canada's mines ministers, to whom the IGWG sub-working group on taxation had reported on the effectiveness of tax credits in a September 2002 report.[6]

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[5] AME Mineral Economics, *Gold Outlook*, January/February 2004.

A number of provinces/territories also chose to further encourage mineral exploration with tax-based incentives and introduced their own measures. Ontario, Saskatchewan, British Columbia and Manitoba chose to harmonize their tax credits with the structure of the federal ITCE. Québec continued its refundable tax credit at the corporate level and the Yukon increased the rate of its refundable corporate and personal income tax credit. All of these measures are further described in the respective provincial/territorial reviews of activities that appear in Section 2 and are described in detail on the web sites of the ministries/departments responsible for mining in each of the above-mentioned provinces/territories.

In its 2002 report, the IGWG sub-working group on taxation, which had for a mandate the evaluation of the effectiveness of these temporary incentives prior to their termination dates, concluded that the ITCE had been reasonably successful in maintaining access to exploration financing for junior companies. The timing of the introduction of the harmonized provincial tax credits and the time it took for industry and investors to adjust to these various programs led to an initially slow uptake on the part of investors. A year later, when it reported to the 2003 Mines Ministers' Conference, the sub-working group was able to demonstrate that, with the aid of a stronger gold price and interesting diamond discoveries, the various incentives had been a strong contributing factor in helping Canada achieve higher exploration levels. In particular, junior company and grass-roots spending were up significantly.

In effect, as had been predicted in the 2001 edition of *Overview of Trends in Canadian Mineral Exploration*, the ITCE and related tax incentives acted as catalysts in attracting mineral exploration investment when metal prices finally showed signs of recovery. The presence of these incentives helped revitalize the all-important junior mining sector and helped ensure a more adequate level of exploration-phase expenditures.

The tax credits also helped re-establish flow-through shares as an important component of exploration and deposit appraisal financing in Canada. In fact, it has been determined by Natural Resources Canada, through an analysis of publicly available company press releases, that flow-through share financings will amount to over $300 million in 2003, compared to $50 million in 2000 (the introduction year for the ITCE). Furthermore, virtually all of the expenditures resulting from these flow-through financings were incurred for work that qualifies for the ITCE and harmonized provincial tax credits.

Both the Prospectors & Developers Association of Canada (PDAC) and The Mining Association of Canada (MAC) have requested an extension of the ITCE beyond the end of 2004.

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[6] Intergovernmental Working Group on the Mineral Industry, *Tax Credits for Mineral Exploration Flow-Through Shares*, Canadian Mines Ministers' Conference, Winnipeg, Manitoba, September 2002.

1.8 SHORT-TERM OUTLOOK FOR EXPLORATION AND DEPOSIT APPRAISAL SPENDING IN CANADA

The three indicators (spending, drilling and claim staking) of exploration and deposit appraisal activity analyzed in this chapter reveal that mineral exploration and deposit appraisal activity in Canada has now returned to more adequate levels.

The downward trend that lasted from 1997 to 2000 is not likely to resume in the near future as long as the outlook for metal prices remains positive and the search for diamonds continues unabated. One potential problem, especially for junior mining companies, could be that most of the federal/provincial tax credits are scheduled to lapse at the end of 2004 unless extensions are announced by respective governments.

While junior-company, exploration-phase and off-mine-site spending appear to be on the right track, more deposit appraisal and on-mine-site expenditures are needed to prove the existence of economically mineable deposits and to replace depleted reserves at existing mine sites. Senior companies that had, for economic reasons, decided to hold back on their mine-site exploration now need to carefully re-evaluate their plans. At the same time, some mines that had closed or suspended operations might prove to be more attractive in the current economic context.

Based on the above analysis and on the current momentum of the Canadian mineral exploration sector, it would seem appropriate to call for a positive short-term outlook for exploration and deposit appraisal activities in Canada.

2. Regional Outlook

2.1 INTRODUCTION

This section presents comments from provincial and territorial officials on recent exploration and deposit appraisal activities in their respective jurisdictions and indicates their expectations for 2003 and beyond. It also highlights important fiscal, regulatory and geoscientific initiatives.

The reader should note that some provinces/territories, in their respective review of activities, use the term "exploration" in its broad sense; that is, it includes both exploration (grass-roots) and deposit appraisal (advanced) components. The expenditure data mentioned by the different provincial and territorial authorities may also differ from those reported in Chapter 1 (official federal-provincial/territorial figures released by NRCan) because some of these jurisdictions use different criteria or definitions in their own analyses.

2.2 NEWFOUNDLAND AND LABRADOR[7]

2002 Overview and 2003 Forecast

Expenditures on mineral exploration in Newfoundland and Labrador in 2002 totalled $44.2 million, a 55% increase over the 2001 level (**Table 10**). The Voisey's Bay discovery sparked an exploration boom that peaked in 1996 with an expenditure of $92.5 million. The following four years saw a steady decline in exploration activity for nickel in Labrador; however, the similar figures for 2000 and 2001 indicated that exploration levels had stabilized. The increase in 2002 is attributable to an increase in spending at Voisey's Bay in Labrador and on gold exploration in Newfoundland. In 2003, expenditures are expected to decline again as a significant portion of the monies spent at Voisey's Bay will be directed towards mine complex development activities.

In 2002, base metals were the primary exploration target and accounted for 77% of total expenditures, followed by gold at 16% and industrial minerals at 7%. Because of Voisey's Bay, base-metal expenditures in Labrador exceeded those in insular Newfoundland by around 7:1. The majority of exploration for gold was in insular Newfoundland whereas industrial minerals and dimension stone exploration activity was evenly disposed province wide.

Claims in good standing for 2002 increased by 40% to 66 287 as the result of a 110% increase in claim staking (33 126 in 2001). The 2002 staking rush followed a December 2001 announcement that Barrick Gold Corporation had entered into an earn-in joint venture on many of Altius Resources Inc.'s claims in the Botwood Basin. Diamond drilling activity increased by 40% in 2002 to 66 696 m. A forecast decrease in claim staking to around 15 000 for 2003 will result in an approximate 15% decrease in claims in good standing for the year; however, it is forecast that levels of diamond drilling will remain on par with 2002 levels.

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[7] The Newfoundland and Labrador review of activities was prepared by Ges Nunn. For more information, the reader is invited to contact Mr. Nunn by telephone at (709) 729-6418 or by e-mail at gesnunn@gov.nl.ca.

TABLE 10. NEWFOUNDLAND AND LABRADOR EXPLORATION STATISTICS, 1995-2003

	1995	1996	1997	1998	1999	2000	2001	2002	2003 (f)
					(dollars)				
Exploration expenditures	71 100 000	92 546 708	71 752 000	47 855 216	32 353 000	27 316 669	28 441 725	44 189 877	23 000 000
Base metals	64 226 300	83 737 940	61 420 000	35 289 730	25 000 000	19 246 046	22 585 446	33 975 242	. .
Precious metals (gold)	5 371 500	6 395 873	5 228 072	3 213 618	4 767 000	6 381 634	2 720 449	7 000 053	. .
Other	1 241 000	2 412 895	2 336 828	12 366 652	2 586 000	1 179 312	3 135 830	3 214 582	. .
					(number)				
Claim staking (year-end)									
Claims staked	248 707	15 299	13 363	14 476	9 643	12 969	15 665	33 126	15 000
Claims in good standing	280 750	168 815	126 766	86 955	57 431	46 880	47 425	66 287	55 000
					(metres)				
Diamond drilling	128 910	235 632	154 638	95 395	116 263	74 546	47 176	66 696	65 000
Exploration	120 803	226 208	141 320	90 428	112 095	67 626	39 455	52 633	. .
Production/development	8 107	9 424	13 318	4 967	4 168	6 920	7 721	14 063	. .

Source: Newfoundland and Labrador Department of Mines and Energy.
. . Not available; (f) Forecast.

In Labrador, the 2002 exploration expenditure highlights were the major deposit appraisal and engineering studies' costs associated with a bankable feasibility study at the Voisey's Bay Ovoid nickel-copper-cobalt deposit and a $26.5 million program by Voisey's Bay Nickel Company Limited, together with exploration programs for nickel by Falconbridge Limited ($1.9 million), mostly at South Voisey, and for iron ore by Iron Ore Company of Canada ($1.2 million) in western Labrador.

For Newfoundland in 2002, the spending highlights were: $1.4 million by Altius Resources Inc. for gold in the Botwood Basin, uranium at Rocky Brook, and base metals at Roberts Arm; $1.3 million by Rubicon Minerals Corporation for gold, mostly in central Newfoundland; $1 million by Aur Resources Inc. to advance the Duck Pond copper-zinc deposit; $0.95 million by Cornerstone Resources Inc. and its partners, principally Noranda Inc., for gold and base metals throughout the Island; $0.8 million by Candente Resource Corp. for gold in the Botwood Basin; and $0.8 million by Gallery Resources Limited for gold and base metals at its central Newfoundland Katie project.

Mining

In September 2002, Voisey's Bay Nickel Company Limited was issued a mining lease for the Voisey's Bay nickel-copper-cobalt deposits, near Nain in northern Labrador, and in March 2003, following a bankable feasibility study, the company announced that open-pit production is scheduled to commence at the Ovoid deposit in 2006.

Three other mining leases were issued in 2002. These were to: Aur Resources Inc. for copper-zinc at Duck Pond, southeast of Buchans in central Newfoundland; Atlantic Minerals Limited for a new dolomite quarry at Lower Cove on the Port-au-Port Peninsula in western Newfoundland; and International Granite Corporation for dimension stone at Finger Pond in the Mount Peyton area of east-central Newfoundland. International Granite Corporation switched production of its "black granite" (gabbro) blocks from Borney Lake to Finger Pond in late 2002.

Hurley Slate Works Company Inc. suspended production at its Trinity Bay operations in 2002, but plans to resume slate production in 2004.

As a result of its 2002 exploration and mining program, reserves at Richmont Mines Inc.'s Springdale area Hammerdown gold mine decreased by 36%. Based on current projections, operations at Hammerdown will cease in June 2004.

Development-Stage Projects

On March 20, 2003, Inco Limited announced the completion of a bankable feasibility study by SNC Lavalin for the open-pit mine, mill, concentrator and related infrastructure at the Voisey's Bay nickel-copper-cobalt deposit. A cost of $860 million was given for the mid-2002 to 2006 pre-production Phase I which, at Voisey's Bay, consists primarily of construction of an open-pit mine at the Ovoid deposit and a 6000-t/d on-site mill and concentrator, together with a $20 million advanced surface exploration program, including diamond drilling and ground geophysics. Open-pit mining is due to start in 2006 at the commencement of Phase II. During this phase, underground exploration, deposit delineation, and feasibility studies will be completed in time for the potential transition from open-pit to underground mining, scheduled for 2011. Resources (all categories) are currently 141 Mt at an estimated grade of approximately 1.5% nickel.

On September 5, 2003, VVC Exploration Corp. announced that it had entered into an agreement to acquire the assets of the central Newfoundland Beaver Brook antimony mine from Beaver Brook Resources Limited for $17 million. A "scoping study" by Watts, Griffis and McOuat was positive and recommended a feasibility study. Resources at the deposit have been estimated at approximately 1.95 Mt (all categories) grading 4.32% antimony. Mine reactivation could occur as early as mid-2004. The mine could supply 5% of the world's antimony trioxide for 20 years.

A decision by Aur Resources Inc. on whether to proceed with production at the Duck Pond copper-zinc property in central Newfoundland is expected in 2004. Current proven and probable resource estimates stand at 5.5 Mt grading 3.3% copper, 5.8% zinc, 0.9% lead, 59 g/t silver and 0.8 g/t gold.

2003 Exploration Highlights - Labrador

Most exploration in Labrador continues to be directed towards nickel; however, iron ore-copper-gold exploration also took place in central Labrador (see **Figure 15** inset).

Voisey's Bay Nickel Company Limited spent approximately $3 million on geotechnical surveys, including diamond drilling, lithogeochemistry and ground and downhole geophysics, and around $165 million on infrastructure at the Voisey's Bay site.

At South Voisey, Falconbridge Limited completed a deep-penetrating airborne geophysical survey. Targets were followed up using a variety of ground geophysical methods and by diamond drilling.

In November 2002, Donner Minerals Ltd. announced that Falconbridge Limited would commit an extra $200 000 to its joint regional exploration program throughout northern Labrador for Voisey's Bay-type deposits outside of the Voisey's Bay and South Voisey areas. Airborne geophysical surveys were conducted in 2003.

Vulcan Minerals Inc. optioned the 100-claim TL nickel-copper-platinum group elements (PGE) property, 50 km northwest of Voisey's Bay in northern Labrador, to Nortec Ventures Corp. in May 2003.

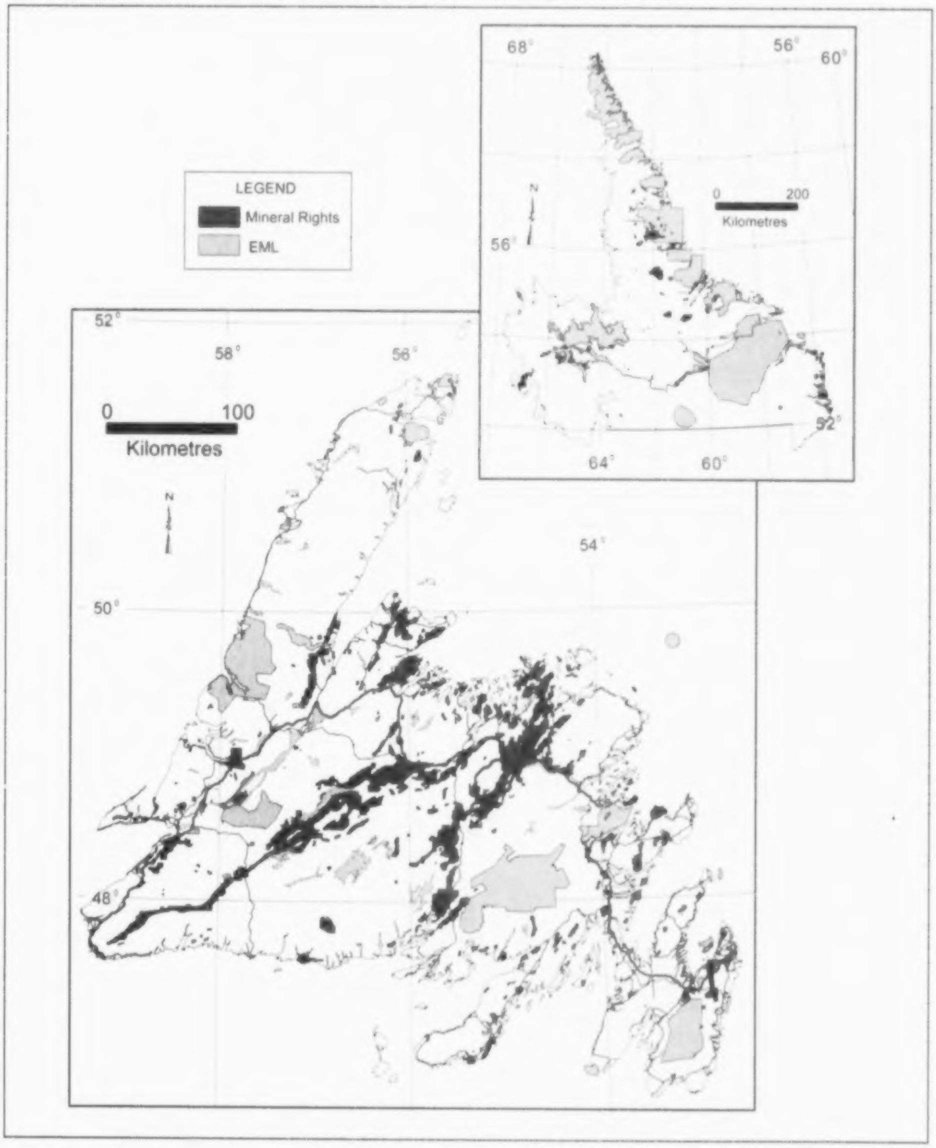
In 2003, other work on areas with nickel and/or PGE potential included diamond drilling by Pathfinder Resources Ltd. at Sachem Bay, near Nain, on its Kernow Resources and Development Ltd. option, and grass-roots exploration by Cornerstone Resources Inc. on options in the Kingurutik River area of northern Labrador and near the Québec border in southern Labrador.

Iron ore-copper-gold exploration was conducted in Labrador's Central mineral belt in 2003. In February 2003, GeoVector Management Inc. staked 1080 claims and Altius Resources Inc. staked 712 claims, the latter in partnership with Fronteer Development Group Inc. Both companies' properties may also have uranium and rare-earth-element potential. In March 2003, Altius Resources

Inc. staked an additional 183 claims within the "belt." In the summer of 2003, an airborne geophysical survey was conducted by GeoVector Management Inc., and Altius Resources Inc. completed a prospecting and sampling program in July 2003.

Iron Ore Company of Canada conducted geological mapping and ground geophysical surveys on its western Labrador iron ore properties.

Figure 15
Newfoundland and Labrador Disposition of Mineral Rights



Source: Newfoundland and Labrador Department of Mines and Energy, Mineral Lands Division.
EML Exempt mineral lands.

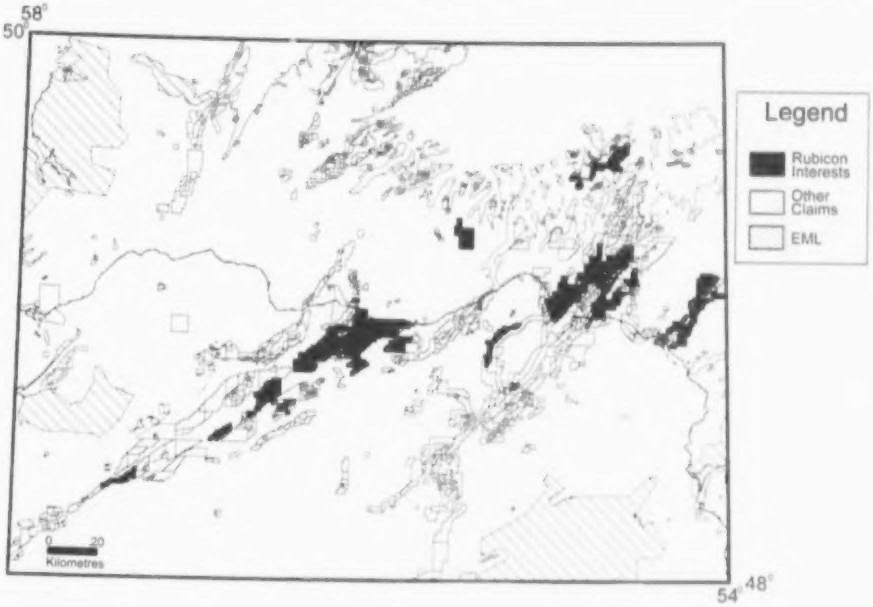
2003 Exploration Highlights - Newfoundland

Since the December 2001 announcement of a joint venture between Barrick Gold Corporation and Altius Resources Inc. in the Botwood Basin of north-central Newfoundland and the ensuing six-month staking rush, gold has been the primary exploration target in Newfoundland (**Figure 15**).

Altius Resources Inc. holds 1166 claims in north-central Newfoundland as part of its sediment-hosted, low-sulfidation, epithermal gold and vein-hosted, mesothermal gold "Botwood Basin projects." The claims lie along the northeasterly Moosehead and Mustang trends, and along the north-northwesterly Miguel trend. The Mustang trend claims have "Carlin-type" gold potential and were joint ventured with Barrick Gold Corporation, which spent $300 000 on geological and geochemical studies. This generated numerous mineralization-favourable structures and new gold showings but, in August 2003, Barrick Gold Corporation withdrew from the option. Altius Resources Inc., in joint venture with Sudbury Contact Mines Limited, completed 1051 m of reverse circulation diamond drilling in 165 holes, ground geophysics, and mobile metal ion geochemical surveys at the Moosehead property in 2003. The Miguel trend properties are subject to an earn-in agreement with CanAlaska Ventures Ltd. Mobile metal ion geochemistry was conducted in 2003.

In 2002/2003, Rubicon Minerals Corporation established an interest in over 6200 claims in the north-central and northeast Newfoundland parts of Newfoundland's Central Mobile Belt (**Figure 16**). Most of these projects focus on mesothermal, gold-bearing quartz veining. Outside of this area, Rubicon Minerals Corporation conducted gold exploration on the Great Northern Peninsula and on its Avalon Peninsula epithermal-gold project. During the 2003 field season, Rubicon Minerals Corporation conducted prospecting, geochemical and ground geophysical studies,

Figure 16
Newfoundland and Labrador, Rubicon Minerals Corporation Property Interests



Source: Newfoundland and Labrador Department of Mines and Energy, Mineral Lands Division.
EML Exempt mineral lands.

airborne geophysics, and diamond drilling programs on each of the Glenwood Break (1477 claims), Star Track (548 claims), Avalon (600 claims), Golden Promise (2162 claims), and Southern Golden Promise (914 claims) projects. In August 2003, abundant gold-bearing float was reported from the Joe Batt's linear, a belt at least 19 km long and parallel to the Glenwood trend, along the eastern edge of the Botwood Basin, and in October 2003 several promising gold values were reported from prospecting and geochemical surveys on the 457-claim New World Island project. By the end of 2003, prospecting, mapping, till sampling and ground geophysics are scheduled for completion at Wing's Point-Titan, together with further trenching and diamond drilling at Golden Promise.

In February 2003, Rubicon Minerals Corporation optioned the Glenwood Break property, the Wings Point-Titan properties and the Southern Golden Promise project to International Lima Resources Corp. This agreement involves $5.25 million in exploration spending by International Lima Resources Corp. over four years for a 60% interest. In September 2003, Rubicon Minerals Corporation optioned the Golden Promise property to Placer Dome Canada Ltd., whereby Placer Dome Inc. could earn a 55% interest by spending $5 million over four years.

Cornerstone Resources Inc. operates the 181-claim option on the Colchester gold-copper property at Green Bay with Sudbury Contact Mines Limited where it has reported additional anomalies and gold showings for geological, geochemical, trenching and diamond drilling follow-up. A portion (241 claims) of the adjacent 301-claim Green Bay gold project is subject to a letter agreement between Cornerstone Resources Inc. and Thundermin Resources Inc., announced in March 2003, whereby the latter may earn a 55% interest by spending $0.5 million over four years. Prospecting, mapping, trenching and soil sampling were completed in 2003.

Terra Nova Gold Corp.'s 46-claim Cape Ray gold project in southwestern Newfoundland consists of three claim groups and contains four deposits. Previous work by Royal Oak Mines Inc. in the late 1980s included over 9000 m of diamond drilling in 35 holes. Terra Nova Gold Corp. reported on additional diamond drilling, totalling 3952 m in 35 holes, in December 2002 and in June and November 2003. The best intersection consisted of 9.99 g/t gold over 6.1 m, including 16.6 g/t gold over 3 m, and was from the Isle aux Morts deposit.

Also in the Cape Ray area, Cornerstone Resources Inc. announced in March 2003 a letter of intent with Thundermin Resources Inc. for the latter to earn up to 55% of its adjacent 1772-claim Cape Ray gold project by spending $1.75 million over five years and, in June 2003, announced options on an additional 125 claims. Approximately $170 000 of high-resolution airborne geophysics, data modelling, prospecting, mapping, and geochemistry were completed in 2003.

In March 2003, Cornerstone Resources Inc. announced an earn-in agreement with Moydow Mines International Inc. on the 356-claim True Grit property, near St. Alban's in southern Newfoundland, and, in the summer of 2003, the two companies staked an additional 603 claims. Consistent low-grade gold results were obtained from diamond drilling programs totalling 2567 m in 36 holes, from which 117 m grading 0.6 g/t gold, including 0.83 g/t gold over 26 m, were reported.

In the Botwood Basin area, Candente Resource Corp. has an interest in over 1300 claims. In 2003, Candente Resource Corp. completed diamond drilling and trenching on its Linear option from the KriASK Syndicate. Preliminary exploration programs were conducted throughout its remaining properties in the Botwood Basin, including at Paul's Pond (optioned from Cornerstone Resources Inc.) and Eastern Pond, southwest of Gander, and at the Virgin Arm property on New World Island in northeastern Newfoundland. New visible gold showings have been reported from many of these properties.

Kermode Resources Ltd. completed a till sampling program on its Jackson's Arm, White Bay, option from South Coast Ventures Inc. and reported multi-sample, clustered gold anomalies in the panned till data.

Linear Resources Inc. optioned the 50-claim Brady property from Datan Resources Ltd. in the fall of 2002. In 2003, 465 additional claims were staked in January, a diamond drilling program was completed in the spring, and a letter of intent was signed with Meridian Gold Inc. in August whereby the latter may earn up to 51% by spending $1.5 million over two and a half years. The property was renamed the Reid property and an additional 64 claims were staked in September 2003. An airborne geophysical survey was completed in the fall of 2003.

Richmont Mines Inc. purchased the Hammerdown Extension property (152 claims) from Commander Resources Ltd. in August 2003. Richmont Mines signed agreements to acquire 100% of the Stog'er Tight property (36 claims) from Ming Minerals Inc. and 70% of the Valentine Lake property (16 377.56 ha) from Mountain Lake Resources Inc. (presently under option from Noranda Inc.) in November 2003. All three properties contain gold prospects.

Anaconda Gold Corp. announced an earn-in agreement with New Island Resources Inc. to acquire a 60% interest in the Pine Cove gold property on the Baie Verte Peninsula by spending $0.5 million on exploration and deposit appraisal by the end of 2004. Exploration was concentrated both along strike and on parallel structures. There is a 10-year-old estimate of reserves on the property of 1.865 Mt grading 3.19 g/t gold.

VVC Exploration Corp. has an interest, through staking and options, in 520 claims along the Appleton Linear (Mustang trend). In the winter and spring of 2003, its programs included mobile metal ion geochemistry and diamond drilling, and the company reported several new zones of low-grade gold mineralization.

Other winter 2002 to fall 2003 gold exploration programs included: a reconnaissance till survey by Altius Resources Inc. on its Twilight and Exploits gold properties in central Newfoundland; prospecting and sampling by Grayd Resource Corporation on its 608-claim Glenwood option from South Coast Ventures Inc.; trenching and rock, soil and heavy mineral concentrate sampling by Candente Resource Corp. on its Staghorn option in southwest-central Newfoundland; and prospecting, mapping and geochemistry by Linear Resources Inc. on its Golden Star option in central Newfoundland. Also, Cornerstone Resources Inc. conducted programs at El Strato on the Baie Verte Peninsula, at Burnt Hill in central Newfoundland, and at Grey River and Dolland Brook in southern Newfoundland.

The principal areas of ongoing base-metal exploration are summarized below.

At the Rambler North copper-gold property on the Baie Verte Peninsula, Altius Resources Inc. tested the down-plunge extension of the Ming deposit by completing a 1257-m-deep diamond drill hole. Directional drilling of an off-hole anomaly, identified by down-hole geophysics, intersected 3.0% copper, 1.2% zinc, 2.8 g/t gold and 25.7 g/t silver over 4.1 m. Also, late in 2003, Altius Resources Inc. commenced deep diamond drilling at its copper-lead-zinc property on Pilley's Island in Notre Dame Bay.

In April 2003, Candor Ventures Corp. announced a letter of intent with Phelps Dodge Corporation of Canada, Limited whereby the former can assume all of the latter's 50% interest in the Mary March property, near Buchans in central Newfoundland, by completing its spending requirements under its option with Noranda Inc. ($755 000 over two years). Previously unpublished results of 1999-2000 diamond drilling on the property by Phelps Dodge Corporation of Canada, Limited include 10.33% zinc, 1.62% lead, 0.66% copper, 118 g/t silver and 4.11 g/t gold over 9.23 m, and 16.8% zinc, 5.44% lead, 0.18% copper, 660 g/t silver and 12.2 g/t gold over 0.91 m within 4.65 m of massive to semi-massive sulphide.

Cornerstone Resources Inc. conducted geological mapping on the Red Cliff stratabound copper property on the Bonavista Peninsula in eastern Newfoundland. (Noranda Inc. withdrew from its option on this property early in 2003.) Cornerstone Resources Inc. is also investigating the iron oxide-copper-uranium-gold-silver-rare earth potential of its nearby Princess property group, where a coincident gravity and magnetic anomaly, reported in February 2003, remains to be tested. Cornerstone Resources Inc. completed compilation work, mapping, lithogeochemistry and ground geophysics on its 137-claim Noel Paul's Brook joint venture with Inmet Mining Corporation in central Newfoundland.

In 2003, exploration programs by Gallery Resources Limited on its Katie base-metal property in central Newfoundland included diamond drilling, ground geophysics, and mobile metal ion geochemistry. Several additional zones of low-grade, epithermal gold and/or stringer volcanogenic massive sulphide mineralization are indicated.

Industrial Minerals Exploration

Altius Resources Inc. has an earn-in agreement with Cameco Corporation on its 573-claim Rocky Brook property in western Newfoundland. The property contains unsourced boulders of Carboniferous sedimentary rocks rich in uranium (up to 11.5% U_3O_8), silver (up to 29 448 g/t), and gold (up to 17.8 g/t). In the fall of 2003, Altius Resources Inc. completed 735 m of sonic drilling in 96 holes over up-ice anomalies having magnetic signatures similar to those identified by an airborne survey in the area of the boulders.

Other industrial minerals exploration includes Vulcan Minerals Inc. (255 claims) for salt and potash, 11213 Newfoundland Limited (192 claims) for gypsum and limestone, and Fenton Scott (180 claims) for potash, salt and, locally, coal, all in western Newfoundland.

Government Incentives

The Government of Newfoundland and Labrador's overall annual contributions to the Junior Company Exploration Assistance Program ($1.75 million), the Prospectors Assistance Program ($250 000) and the Dimension Stone Incentive Program ($250 000) are unchanged for 2002/2003. Activities eligible for funding by the Junior Company Exploration Assistance Program have been expanded to include property-wide geochemical, and airborne and ground geophysical surveys. While the per-project funding available to junior companies on the Island remains at $100 000, the amount in Labrador has been increased to $150 000. Advanced prospecting grants of up to $10 000 remain available under the Prospectors Assistance Program, as does the flexibility to move funds from one program to another.

In 2002, 99 prospectors received support from the Prospectors Assistance Program. In 2003, a similar number of prospectors will receive assistance. Combined assistance from the Junior Company Exploration Program, mostly for diamond drilling, and the Prospectors' Assistance Program is expected to reach $2.1 million in 2003.

Legislative Changes

The Mineral Lands Division of the Department of Mines and Energy is proceeding towards the establishment of on-line staking. Several legislative and regulatory amendments are required to facilitate the procedural changes associated with on-line staking; primarily, these deal with the staking process, electronic payment (credit card), and mandatory conversion of ground-staked claims to map-staked claims. A spring 2004 start-up is scheduled.

In 2003, the Department of Mines and Energy issued several surface leases to active mining operations. These leases are issued under the *Mineral Act*.

2.3 NOVA SCOTIA[8]

Overview

Exploration activities in Nova Scotia have increased significantly in 2003 with many of the new projects focussed on gold potential in several geological environments. In addition, numerous projects were directed at a variety of industrial mineral commodities, including titanium-bearing heavy mineral sands, quartz, barite, limestone and dolomite, and at base metals.

Much of the gold exploration activity has been targeted at high-grade lode-gold veins in the Meguma group rocks of southern Nova Scotia. Other gold projects evaluated the potential for low-grade bulk-mineable disseminated gold deposits in Meguma group rocks. Several exploration companies focussed on the potential for iron oxide-copper-gold (IOCG) deposits along the Cobequid-Chedabucto fault zone in central Nova Scotia.

Exploration expenditures in Nova Scotia are forecast to be $4.5 million for 2003 (**Table 11**), up more than 100% from the $2.0 million spent on exploration in 2002. The total area under exploration licence in Nova Scotia, including new and re-issued claims and special licences, is projected at approximately 301 730 ha, equivalent to 18 500 claims, up more than 50% from 200 240 ha (12 277 claims) in 2002. Total exploration drilling for 2003 is forecast to be 10 000 m, up significantly from the 3540 m of drilling in 2002.

Mining

Georgia Pacific Corporation commenced mining operations at its Melford gypsum mine in southwestern Cape Breton Island in 2002 and, at the time this report was prepared, the mine was in full production. The Melford mine replaces the company's Sugar Camp mine, which is currently being reclaimed.

Pioneer Coal Limited produces coal from the Foord Seam at its Stellarton coal mine using the company's proprietary high-wall miner, the NovaMiner 2000. The company-designed and -built machine is capable of extracting coal from seams in excess of 25° dip from high-wall faces.

MacLeod Resources Limited is in the early stages of production and is modifying its processing facility at its marble quarry near River Denys, Cape Breton Island. To date, blocks of red and blue-grey marble have been extracted and the company is conducting test processing and market development.

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[8] The Nova Scotia review of activities was prepared by Michael MacDonald. For more information, the reader is invited to contact Mr. MacDonald by telephone at (902) 424-2523 or by e-mail at mamacdon@gov.ns.ca.

TABLE 11. NOVA SCOTIA MINERAL EXPLORATION STATISTICS, 1996-2003

	1996	1997	1998	1999	2000	2001	2002 (p)	2003 (f)
Exploration expenditures (field + overhead) ($)	6 892 000	6 726 000	4 835 112	3 600 000	3 700 000	2 900 000	2 000 000	4 500 000
Claim staking (new and reissued) (general + special licences) (no. of claims)	34 265	26 403	9 440	14 249	9 624	8 406	12 277	18 500
Exploration diamond drilling (metres)	15 600	26 487	20 297	16 860	8 200	5 470	3 540	10 000

Source: Nova Scotia Department of Natural Resources.
(f) Forecast; (p) Preliminary.

Development-Stage Project

Black Bull Resources Inc. received environmental assessment approval for its White Rock quartz mine in late 2002 and was in the process of applying for the remainder of the necessary permits to begin production when this report was prepared. The company was issued a Crown Land Lease on October 23, 2003. On August 11, 2003, Black Bull announced that it had signed an exclusive marketing and sales agreement for its quartz product with U.S. Silica Company, the largest marketer of quartz/silica products in North America with over a century of experience and an annual sales volume in excess of 6 Mt. Black Bull reports that the next steps for the White Rock project, leading up to a production decision, include the completion of permitting, additional market development work with U.S. Silica, testing to prepare final design and economic data for a mining, crushing and screening facility, and assessing the best method to finance the facility. Black Bull reports a resource of high-quality quartz (silica) with total measured plus indicated quartz resources of 12.2 Mt grading 97.4% SiO_2 with an additional inferred quartz resource of 7.3 Mt at the White Rock property.

Exploration Highlights

Gold - Southern Nova Scotia

Diamond Ventures NL, an Australian-based mining company, entered into an agreement with Moose River Resources Inc. in May 2003 to earn an interest in the Touquoy project located in Moose River, east of Halifax. Known resources for the sediment-hosted gold deposit include 3.8 Mt of indicated resources grading 2.22 g/t gold, or 274 000 oz, and 1.9 Mt of inferred resources grading 2.15 g/t gold (131 000 oz). Diamond Ventures can earn a 60% interest in the property by spending $2.7 million prior to December 31, 2005, on exploration, evaluation and development of the property. The company conducted due diligence work on the deposit in 2003 prior to commencing new work.

Acadian Gold Corporation commenced a 25-hole, 5000-m drilling program on its Forest Hill project in eastern Nova Scotia in June 2003. The drilling program was still under way at the time this report was prepared, with preliminary results confirming the presence of auriferous zones. Assay results from two holes (FH-03-8 and -9) for 1.2-m true widths were released in October 2003 and include levels of 31.48, 23.26, 248.82 and 11.12 g/t gold (uncut). Drill holes are being targeted to define shallow-plunging, multiple stacked gold mineralized shoots, which Acadian Gold is terming "ribbons." The company is promoting the similarities between Nova Scotia gold deposits and the prolific belt in the Bendigo-Ballarat region of Australia and plans to apply the Australian "Ribbon Model" to its Nova Scotia deposits. The company currently has six gold properties in its portfolio, including the past-producing Forest Hill and Beaverdam deposits.

Azure Resources Corp. obtained the right to earn a 100% interest in the Mooseland gold property located 70 km northeast of Halifax from Globex Mining Enterprises Inc. in 2002. Previous reports by Acadia Mineral Ventures in 1987 describe an uncut drill-indicated reserve for the Mooseland deposit of 2.02 Mt grading 0.39 oz/ton gold over an average mining width of five feet (1.5 m) to an average depth of 1000 feet (305 m). An underground decline was initiated in the summer of 2003 and was advancing to the target zones where the company plans to extract an underground bulk sample. In June 2003, Azure Resources Corp. reported it had signed an option agreement with Newfoundland Goldbar Resources Inc. for the Dufferin mine. Azure has been granted an option to earn up to 51% of the Dufferin mine by making payments and conducting work on the property over a one-year period, after which Azure and Newfoundland Goldbar will enter into a joint venture for the exploration and development of this property. A total of 9788 oz of gold was produced from the Dufferin mine in 2001.

Scorpio Mining Corporation announced in early 2003 that it had optioned the Cochrane Hill gold deposit, located in Guysborough County, from a private interest. The deposit is situated in a steeply dipping quartz vein zone (18-36 m wide) in slate, adjacent to the axis of the Cochrane Hill anticline.

Digital compilation of all past drilling, trenching, surface and underground sampling programs has been completed on the Cochrane Hill gold project and three-dimensional modelling of the deposit was under way at the time this report was prepared. The goal at Cochrane Hill is to identify a high-grade core within the broad mineralized zone delineated by previous operators. Positive results from this modelling study will trigger a preliminary economic assessment of the deposit.

AYARCO Gold Corporation Ltd. continued to explore for gold at its Kemptville property located between the former producing Kempt and Cowan gold mines near Yarmouth. The company completed a four-hole drilling program in May 2003 near the former Kempt mine. Based on encouraging results, the company completed a program of prospecting, rock and soil geochemistry, and trenching, and is currently conducting a follow-up drilling program.

Hudgtec Consulting Ltd. conducted compilation and geochemical confirmation work in its 55-km^2 Stewart Lake project in the Eastern Shore area near Isaac's Harbour. The company is following up on widespread geochemical anomalies from previous government surveys in an area underlain by felsic granitic intrusions with a major northwest-trending fault-shear structure. An analysis of heavy mineral till concentrates collected in 2003 returned levels of up to 12 600 parts per billion (ppb) gold.

Gold - Northern Nova Scotia

Monster Copper Corporation and Wallbridge Mining Company have staked a large land position in Nova Scotia. The staking covers a total of 507 km^2 in northern Nova Scotia. The claims are proximal to the Cobequid-Chedabucto fault, a major regional fault zone that hosts copper, cobalt and gold occurrences with IOCG attributes, commonly referred to as "Olympic Dam"-style deposits. Sampling and analysis confirmed reported results of copper-gold mineralization associated with high-iron breccias. Grab samples from old workings at the Copper Lake property returned assays up to 4.02% copper, 486 ppb gold and 2.3 parts per million (ppm) silver. Prospecting and geological work were under way at the time this report was prepared, with plans for geophysical surveys to identify additional targets for drilling in early 2004.

Avalon Ventures Ltd. issued a press release on March 10, 2003, reporting that it had signed a letter of intent to acquire a 60% interest in a gold prospect located in the Cobequid Highlands of northern Nova Scotia. The property consists of 1490 claims underlain by Silurian and Devonian volcanic rocks with geological and geochemical indications of an "Appalachian-type" gold environment. The area was previously explored by a major oil company for uranium; however, samples and drill core were not analyzed for gold "despite the presence of locally abundant sulphide mineralization containing highly anomalous levels of copper, zinc and silver." Avalon announced on November 4, 2003, that it had acquired three properties in central Nova Scotia with potential for Olympic Dam-style IOCG deposits, including the Mount Thom prospect. Avalon also announced that it had discovered a new occurrence of mineralized altered granite boulders that assayed up to 3.32% copper, 0.61 g/t gold, 0.70 g/t silver and 0.01% cobalt.

Titanium

Titanium Corporation Inc. conducted bench tests on bulk samples from its titanium-zirconium heavy mineral sand project located near Truro at the company-funded pilot plant located in the Minerals Engineering Centre at Dalhousie University. An independent valuation report indicated a probable reserve of 330 941 945 t of sand with an average heavy mineral grade of 1.94%. A six-hole drill program was conducted in June 2003 to test the western limits of the heavy mineral sand deposits in Cobequid Bay. Analytical results indicated the weighted-average-percent total heavy mineral content from the six holes ranged from 1.65% to 3.27%. Mineralized zones varied from 3.12 to 7.81 m in thickness. Based on the encouraging results, Titanium Corporation acquired four additional exploration licences in August 2003 covering approximately 30 km^2. The company plans to conduct a drilling program on the newly acquired ground in early 2004 to test the western extent of the mineralized sands.

Landis Mining Corporation issued a press release on September 4, 2003, reporting initial results from a sampling program in the Shubenacadie River. The Landis report confirms the continuation of titanium-bearing heavy mineral sand deposits upstream from the Titanium Corporation Inc.'s claims. The work was conducted on the company's recently acquired 100% interest in 102 mineral exploration claims covering approximately 4080 acres of the Shubenacadie River in central Nova Scotia.

Carbonate

Glencoe Resources Inc. and Atlantic Industrial Minerals Ltd. continue to evaluate several carbonate deposits on Cape Breton Island, including the Glencoe and Kewstoke deposits. The companies are evaluating the potential for production of several end-products, including high-purity limestone for lime production and high-brightness carbonate for filler applications. The companies have conducted trenching, sampling and compilation work in 2003.

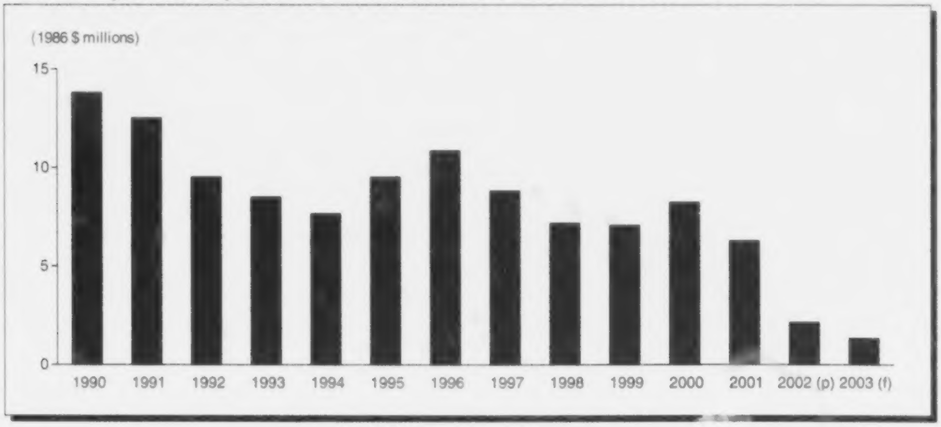
Alva Construction Limited completed an initial program of mapping, trenching, drilling and analysis at its Glendale property in southeastern Cape Breton Island. The company has defined several zones of high-calcium carbonate that are suitable for use in lime production and other chemical applications.

2.4 NEW BRUNSWICK[9]

Exploration Highlights

The New Brunswick exploration sector in 2003 experienced activity levels that were below those reached in 2002. It is anticipated that exploration expenditures for New Brunswick in 2003 will be approximately $2 million (current dollars). **Figure 17** shows exploration trends as expressed by monies spent on exploration projects in New Brunswick over the past 14 years.

Figure 17
Mineral Exploration Expenditures in New Brunswick, 1990-2003



Source: New Brunswick Department of Natural Resources and Energy.
(f) Forecast of intentions; (p) Preliminary.
Note: General plus mine-site expenditures (includes overhead costs).

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[9] The New Brunswick review of activities was prepared by Don J.J. Carroll. For more information, the reader is invited to contact Mr. Carroll by telephone at (506) 453-2206 or by e-mail at Don.Carroll@gnb.ca.

During the latter part of 2003, a surge in mineral claim staking was experienced in northern New Brunswick. This activity resulted in the number of new claims recorded in the province reaching a new high since the year 2000. In 2003, 2936 claims were recorded, compared to the 2118 claims that were recorded in 2002, a 38.6% increase.

Metallic Minerals

Northern New Brunswick

Exploration expenditures in the northern half of the province for 2003 were approximately $0.9 million, slightly higher than last year. Since the beginning of the year, the number of new claims recorded in northern New Brunswick is 2508, more than triple the number for 2002 (663).

No major companies were active in 2003 but CanZinco Ltd., Noranda Inc. and Teck Exploration Ltd. still hold land positions in northern New Brunswick (**Figure 18**).

The junior mining companies that were active in the region included Acadian Gold Corporation, Aeroquest Limited, First Narrows Resources Corp., Montoro Resources Inc., Mountain Lake Resources Inc., Nicon Holdings Ltd., Slam Exploration Ltd. and Stratabound Minerals Corp. Other juniors, such as Commander Resources (formerly Major General Resources), Eastmain Resources, Fancamp Exploration Ltd., Forest Gate Resources, Freewest Resources, PGE Resource Corp., Royal Roads Corp. (formerly Kelmet Resources) and VenCanGold Corporation held ground but did little or no work on their claims during the year.

Acadian Gold Corporation optioned 87 claims from prospectors Lorenzo Noel and Claude Willett (Bathurst Exploration Ltd.) in late October. Earlier in the summer, these prospectors discovered a silicified breccia zone in the North Tetagouche area from which grab samples (in trenches) reportedly assayed up to 39 g/t gold. The company plans to carry out a ground geophysical survey on the property before year-end to help identify drill targets.

Aeroquest Limited plans to conduct an airborne survey (electromagnetic [EM] and magnetic Mag) in the Rocky Brook-Millstream area, northwest of Bathurst, before year-end. The purpose is to delineate structures and intrusions in the vicinity of the Nicolas Denys granodiorite, which could host gold mineralization. A local prospector, Merton Stewart, assayed a quartz boulder from the contact aureole of this intrusion, which yielded bonanza-grade gold (over 2500 g/t).

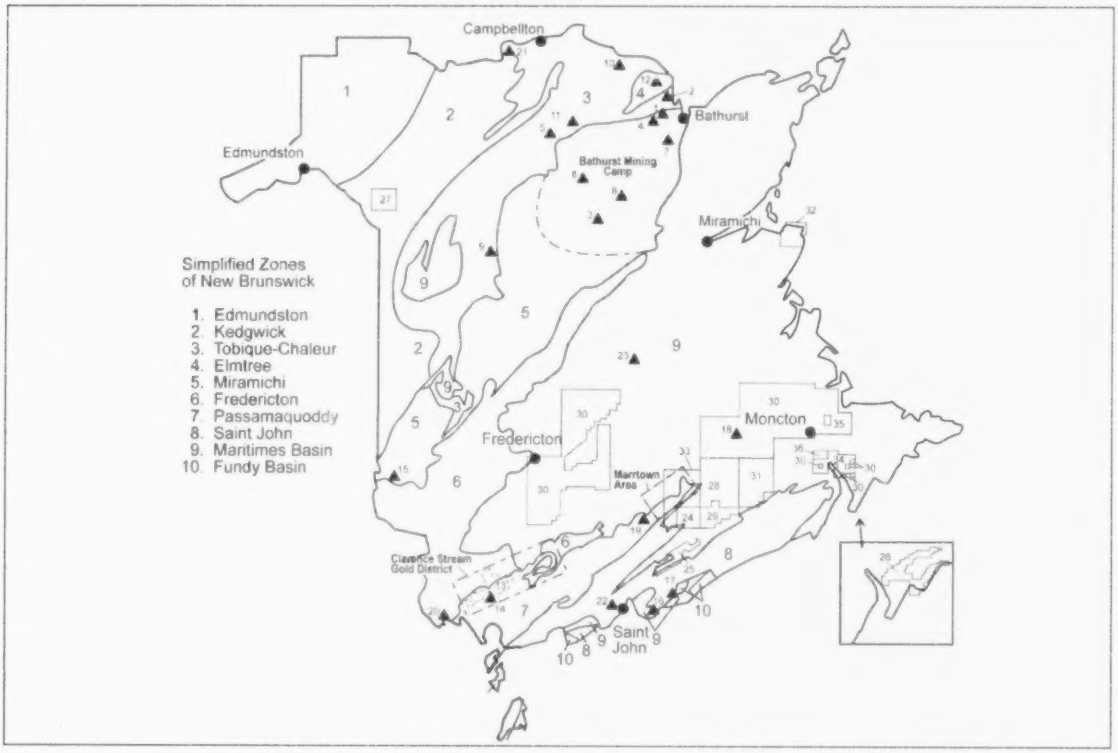
First Narrows Resources Corp. conducted a 13-hole drilling campaign totalling 1303 m on the Chester property in the southern part of the Bathurst mining camp. The purpose was to test the upper part of the stringer zone beneath the massive sulphide lens. The company also added 157 claims to its land position in this area and optioned another 57 claims from local prospectors Anthony and Delbert Johnston. First Narrows also added 77 claims to its Middle River gold property, west of Bathurst, and conducted an induced polarization (IP) survey to help delineate drill targets.

Montoro Resources Inc. plans to drill its 37-claim Malachite property, under option from Log House Construction Ltd., before year-end. Last year the company conducted a trenching program to find the bedrock source of cobalt mineralization, which assayed up to 2496 ppm cobalt and appears to be fracture controlled and hosted by a Lower Devonian rhyolite.

Mountain Lake Resources Inc. carried out an eight-hole drilling program totalling 890 m on its Goodwin Lake base-metal property in the western part of the Bathurst mining camp.

Nicon Holdings Ltd., with partners Intrepid Minerals Corporation and Jilbey Gold Exploration Ltd., carried out preliminary exploration on its Fleming Brook claim group, located in the eastern part of the Bathurst camp, to find the bedrock source of copper and lead soil anomalies. Drilling is slated to begin before Christmas.

Figure 18
Highlighted Exploration Properties in New Brunswick, 2003



Numbers refer to locations on map above.

1. Claims, Fall's Grid (Acadian Gold Corporation)
2. Claims, Grants Brook (Heron Mines Limited)
3. Claims, Chester North Ext. Chester West (First Narrows Resources Corp.)
4. Claims, Middle River North Group (First Narrows Resources Corp.)
5. Claims, Malachite (Log House Construction Ltd.)
6. Claims, Goodwin Ext., Goodwin South, Goodwin East. Goodwin West Ext. (Mountain Lake Resources Inc.)
7. Claims, Flemming Brook (Nicon Holdings Ltd.)
8. Claims, Ohearn-Strachens (Slam Exploration Ltd.)
9. Claims, Costigan (Slam Exploration Ltd.)
10. Claims, Nash Creek (Slam Exploration Ltd.)
11. Claims, Ramsay (Stratabound Minerals Corp.)
12. Claims, Alcida Gold (George Murphy)
13. Claims, Clarence Stream area (Freewest Resources Canada Ltd.)
14. Claims, Birney Lake (Union Gold Inc.)
15. Claims, Golden Ridge (First Narrows Resources Corp.)
16. Claims, Millican Lake (M. McNamara), Armstrong Brook (Pro-Max Resources Inc.) and others
17. Claims, Marigold (Ken Whaley)
18. Claims, New Canaan (Geodex Minerals Ltd.)
19. Claims, Devils Pike, Devils Pike Ext. (PGE Resource Corporation)
20. Claims, St. Stephen (Xemac Resources Inc.)
21. Claims, Flatlands, Dawsonville (Flatlands Limestone Ltd.)
22. Claims, Ketepec (Ketepec Development Ltd.)
23. Flagstone occurrence, Doaktown area
24. Oil and natural gas licence to search (Potash Corporation of Saskatchewan Inc.)
25. Underground storage exploration licence (Corridor Resources Inc.)
26. Underground storage exploration licences (Intragas Energy, LP)
27. Oil and natural gas licence to search (Jean Mariadassou)
28. Oil and natural gas licences to search (Corridor Resources Inc.)
29. Oil and natural gas licence to search (Corridor Resources Inc. and Potash Corporation of Saskatchewan Inc.)
30. Oil and natural gas licences to search and leases (Columbia Natural Resources Canada, Ltd.)
31. Oil and natural gas licences to search (Corridor Resources Inc. and Columbia Natural Resources Canada, Ltd.)
32. Oil and natural gas licence to search (Norton Energy Inc.)
33. Oil and natural gas licence to search (Corridor Resources Inc. and Globex Resources Ltd.)
34. Oil and natural gas leases (J.A. Seglund Inc.)
35. Oil and natural gas lease (RHT Enterprises Ltd.)
36. Oil and natural gas lease (Irving Oil Limited)

Source: New Brunswick Department of Natural Resources and Energy.

Slam Exploration Ltd. initially planned to drill its Ohearn-Strachens base-metal property in the central part of the Bathurst camp but this was postponed because the company announced that it had signed a joint-venture agreement with Noranda Inc. "to explore approximately 200 square miles of claims" in the camp. The joint-venture agreement calls for the expenditure of $25 million over the next five years.

Outside the Bathurst camp, Slam Exploration is currently drilling its Mount Costigan base-metal property east of Plaster Rock and plans to carry out an airborne gravity survey over its Nash Creek base-metal property located at the northern end of this same belt.

Stratabound Minerals Corp. carried out preliminary exploration on its 61-claim Ramsay Brook gold property, located 75 km west of Bathurst in the Tobique-Chaleur Belt and, as a result of this work, added another 17 claims to the northern and eastern parts of the Ramsay Brook property. The company has also optioned 10 claims that encompass the Elmtree (or Alcida) gold deposit that was discovered by George Murphy in the late 1980s.

Southern New Brunswick

Much of the exploration activity in southern New Brunswick during 2003 (**Figure 18**) focused on gold in the vicinity of Clarence Stream, east of St. Stephen. Work conducted by exploration companies, provincial and federal geological surveys, and the University of New Brunswick in this area and in south-central New Brunswick has demonstrated that a world-class gold district is emerging in the region. The intrusion-related gold model has been firmly established for most of the deposits and occurrences, and their association with the Saint George and Pokiok granitic batholiths has been confirmed.

GOLD EXPLORATION IN THE CLARENCE STREAM DISTRICT

As in previous years, Freewest Resources Canada Inc. has spearheaded the exploration effort in the vicinity of Clarence Stream concentrating on drilling programs on its Anomaly A area. The drilling program during 2003 successfully linked this zone to the MW zone, another previously explored mineralizing system likely containing similar tonnage and grades. Ore shoots in this area and in other higher-grade zones 3 km to the southeast are open along strike, indicating that sizeable, potentially mineable deposits may be present in this region.

Several other junior mining companies and local prospectors were active in this area during 2003, including Union Gold Inc., William Gardiner (Southfield Resources Ltd.), Emilio Doiron (Pro-Max Resources Inc.), Dave Stevens, Kim Reeder, Karen MacKay, David O'Neill, Raymond Thorn and Peter Fenety. In addition to delineating numerous other highly prospective showings in the area, the prospectors have demonstrated that the potential for mineralization like that at Clarence Stream extends tens of kilometres along strike.

GOLD EXPLORATION OUTSIDE THE CLARENCE STREAM DISTRICT

First Narrows Resources Corp. maintains large holdings in the Poplar Mountain area west of Fredericton and has an ambitious drilling program planned. Widespread gold-mineralized zones in this area that extend into the state of Maine are associated with a major terrane-bounding fault zone that transects high-level, intermediate intrusions.

During the year, Geodex Minerals Ltd. had extensive holdings in a northeasterly trending thrust/fold belt that includes the former Cape Spencer gold mine, east of the port city of Saint John. Its work established the presence of a broad zone containing auriferous quartz vein systems over several kilometres on the property. Ken Whaley also conducted trenching and sampling programs along strike to the northeast in the same belt where a similar style of gold mineralization is present.

Geodex has also staked claims in underexplored Carboniferous rocks along the Canaan River northeast of Sussex. The company's interest in this unlikely area was precipitated by reconnaissance work conducted by local prospectors. Following up on novel theories for potential gold deposits in these rocks, the prospectors delineated an extensive, several-kilometres-long geochemical anomaly from numerous soil samples yielding up to 237 ppb gold. It is anticipated that positive results from Geodex's work this year will open up exploration opportunities in the province's extensive Carboniferous basins.

Local companies (Southfield Resources Ltd. and Pro-Max Resources Inc.) and prospectors (William Carter and Cyril Beaman) have been active in the Marrtown area north of Sussex where high-grade gold mineralization was previously discovered in association with fault structures in highly altered gabbroic rocks. Geochemical surveys conducted by these explorationists have outlined numerous anomalous zones in this area that warrant intensive follow-up exploration.

PGE Resource Corp. and several prospectors continued evaluating the gold potential in the Annidale Belt northwest of Sussex, a well-known, mineral-rich area in the province that holds high potential for economic gold, antimony and base-metal sulphide deposits.

EXPLORATION FOR OTHER COMMODITIES

There has been some work conducted in the search for other metallic mineral or precious-metal commodities in southern New Brunswick during 2003. Interest in nickel-copper-cobalt deposits has been rejuvenated by Xemac Resources Inc.'s acquisition of claims in the St. Stephen area where mafic and ultamafic intrusions host potentially economic concentrations of these commodities.

Mark Connell and Don Hattie of Geosleuths were also active in various locations in the province assessing the potential of lamprophyre dykes to generate economic precious-metal and gem mineralization.

Nonmetallic Minerals

During 2003, industrial mineral exploration and development opportunities continued to be pursued in northern, southern and central New Brunswick. In the northern part of the province, Flatlands Limestone Ltd. continued to evaluate mapping and drilling results on its high-calcium limestone property west of Campbellton. The company also staked an additional 43 mineral claims south of its original claim block. In southern New Brunswick, Ketepec Development Ltd. renewed interest in its limestone and dolomite claim block 5 km west of the City of Saint John. Detailed mapping and sampling were undertaken during the summer followed by a five-hole drilling program completed late in the year. In central New Brunswick, a local stone company is encouraged by potential development opportunities with respect to flagstone resources south of Doaktown.

Outlook

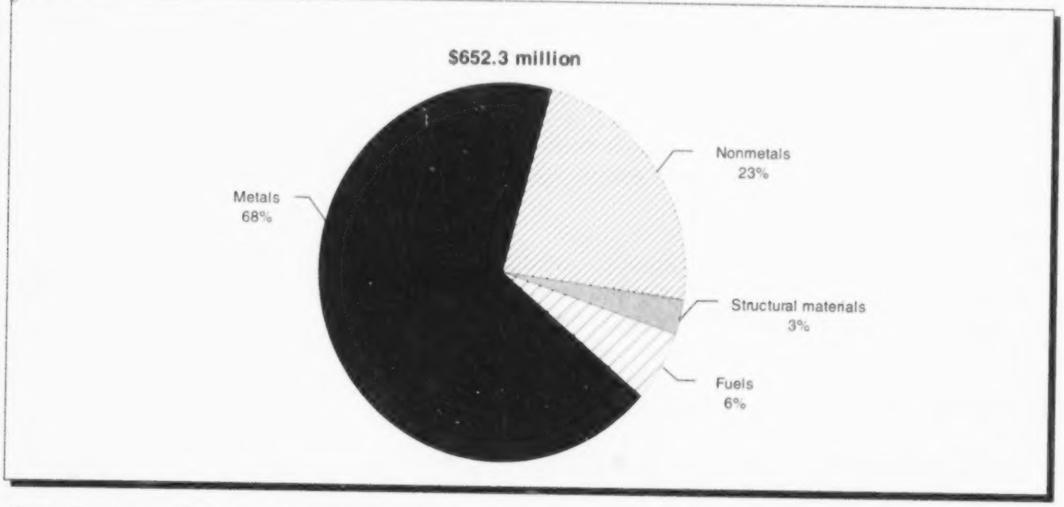
In 2004, New Brunswick should see increased exploration activity in the north, the result of the special incentive program announced late in the year by the Government of New Brunswick. Exploration activity in the south of New Brunswick is expected to remain steady.

Mining Highlights

Value of Production

The 2002 value of mineral production (including coal) in New Brunswick is estimated to be $652 284 987, representing a decrease of 19.6% from the final value of $807 202 968 in 2001 (**Figure 19**).

Figure 19
New Brunswick Mineral Production Value, 2002



Source: New Brunswick Department of Natural Resources and Energy.

The decrease was due to a fall in the production of zinc, as well as a marked reduction in the zinc price. The value of the Canadian dollar remained almost unchanged at US64.03¢, down 1% from the previous year when it averaged US64.58¢.

The value of metals production during the year was $440 923 232, representing 68% of the province's value of mineral production. Overall, the sector was down by 24%. Noranda's Brunswick mine, the province's sole metals producer, experienced lower ore production than in 2001. CanZinco's Caribou mine remained shut down for the fourth full year after low metal prices and metallurgical difficulties had forced a suspension of operations in August 1998. Despite a weaker performance than in the previous year, zinc continued to dominate the metals sector with a value of $313 683 092, representing 71% of the total value of metals. The value of zinc production decreased by approximately 29% from 2001. The zinc price fell by 12% between 2001 (US40.2¢/lb) and 2002 (US35.3¢/lb). The slight drop in the average exchange rate of the Canadian dollar was not a significant contributor to the value of production as expressed in Canadian currency. Lead also was a factor in the drop in metals value as production fell by 11% while the price decreased by almost 5% (US20.5¢/lb, down from US21.6¢/lb in 2001). The value of copper production was almost unchanged at $22 115 646 as the price decreased by just over 1% (70.7¢/lb in 2002 vs. 71.6¢/lb in 2001) and production decreased by less than 1%. Antimony, bismuth and cadmium continued to be produced as by-products from the Brunswick operation. The total value of the three by-product metals decreased by 32%, mainly because of a substantial decline in bismuth production. Despite a 6% decline in the quantity of gold produced, the value actually increased by 8% as the result of a 14% increase in the price. A 5% increase in the silver price was not enough to offset an 11% decrease in production as the value of silver fell by 6%.

The nonmetals sector of the industry contributed $151 893 181 (23%) to the value of mineral production, a 10% drop from the revised 2001 value. The largest contributor to the value of nonmetals production is potash. Both the value and quantity of potash decreased from 2001 levels. Potash Corporation of Saskatchewan's Penobsquis mine ceased production for a total of 72 days for inventory adjustment. Peat, the second largest contributor ($45 020 608) to the value of nonmetals production, represented 30% of the sector's value. The quantity and value of peat produced fell for the second consecutive year. Salt and sulphur in smelter gas ranked next in value of production with quartz and marl being minor contributors to the nonmetals sector.

The value of coal produced by N.B. Coal Limited in the Minto-Chipman area increased by 11% to $22 088 000 as production rose by 18%.

The value of production for structural materials (lime, stone, sand and gravel) decreased 4% to $37 380 574. Sand and gravel production was down 2% while stone production decreased by 5%. These commodities provide the raw materials for the construction industry in New Brunswick.

As reflected in the mineral production value trend graph for the past 10 years (**Figure 20**), for a variety of reasons, New Brunswick is experiencing a slow progressive decline in its value of mineral production.

In 2002, New Brunswick ranked first among Canadian provinces and territories in its value of production for zinc, lead, bismuth, antimony and peat; second in potash; and third in silver and cadmium. New Brunswick is the only producer of marl.

The mineral industry employed an average of 3167 people in 2002. **Table 12** shows employment (permanent and seasonal) by sector.

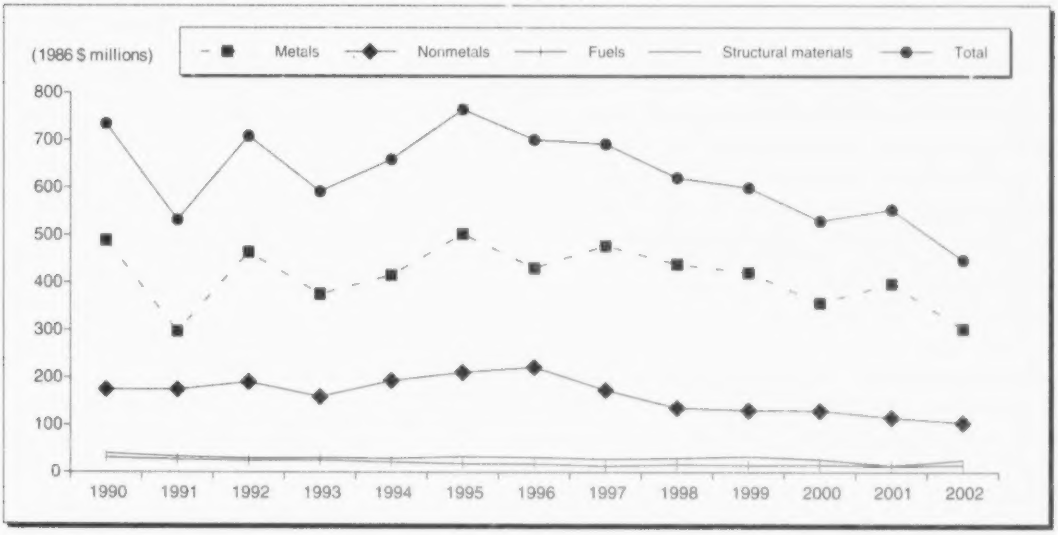
Provincial Exploration and Development Initiatives

As part of New Brunswick's efforts to stimulate exploration activity, the Department of Natural Resources introduced the New Brunswick Junior Mining Assistance Program and the New Brunswick Prospector Development Program in fiscal year 2001/2002. These three-year programs have an annual budget of $600 000.

The New Brunswick Junior Mining Assistance Program (NBJMAP)

The main objective of the program is to provide financial assistance to junior mining companies in order to increase the probability of finding economic reserves of mineral resources in New Brunswick. This program will provide up to 50% of the project cost to a maximum of $40 000 per

Figure 20
New Brunswick Mineral Production Values, 1990-2002



Source: New Brunswick Department of Natural Resources and Energy

TABLE 12. EMPLOYMENT IN NEW BRUNSWICK'S MINERAL INDUSTRY, BY SECTOR, 2002

Sector	Employees (Permanent and Seasonal)
	(no.)
Metals	1 447
Potash	412
Coal	76
Peat	1 138
Structural materials	94
Total	3 167

Source: New Brunswick Department of Natural Resources and Energy.

company per year. The minimum amount available per project is $10 000. The remaining costs of the project will be borne by the applicant, either in cash or "in-kind" work. In 2003, the NBJMAP Review Committee recommended that 13 applicants receive assistance for a total of $454 000.

The New Brunswick Prospector Development Program (NBPDP)

The New Brunswick Prospector Development Program (NBPDP) was initiated in fiscal year 2001/2002 with the same objectives and guidelines as the previous successful program. However, the program has been broken down into several elements: the New Brunswick Prospector Assistance Program ($260 000), Prospector Training ($25 000), Prospector Rewards (up to $5000), and Prospector Promotion ($20 000).

In 2003, the NBPAP Review Committee recommended 49 prospectors receive assistance ($250 000) under the Prospector Assistance Program.

Bathurst Mining Camp Initiative

Recognizing the importance of the mineral industry sector to the economy of not only northern New Brunswick, but to the province as a whole, the Government of New Brunswick announced in early October an annual grant program for the Bathurst mining camp. Fifteen million dollars ($2.5 million annually) will be invested in advanced exploration over the next three years with a possible extension of two additional years and a further $10 million if the private sector provides matching funds. Only producing mines are eligible and it is anticipated that Noranda Inc. will take advantage of this new program.

Special Projects

The Targeted Geoscience Initiative (TGI) program, a cooperative venture between the Geological Survey of Canada and the New Brunswick Department of Natural Resources, continues to play a vital role in projects aimed at stimulating exploration activity in New Brunswick.

Under the TGI program in New Brunswick, projects in both the northern and southern parts of the province are being carried out. The New Brunswick TGI projects have enjoyed tremendous support from the private sector through logistical and monetary support and information transfer.

In 2003, the New Brunswick Geological Surveys Branch worked closely with the Geological Survey of Canada, the University of New Brunswick, Acadia University, and industry. The TGI project titled "Metallogeny of Intrusion-Related Gold Systems in Southern New Brunswick" ended in 2003. A renewed TGI two-year program will include an aeromagnetic survey in the Marrtown area of southern New Brunswick and hydrocarbon potential studies in the Carboniferous Moncton Subbasin and in Devonian rocks of northern New Brunswick.

2.5 QUÉBEC[10]

A Destination of Choice for Mineral Exploration

Overview

The investment climate in Québec is particularly conducive to mineral exploration, as evidenced by heightened levels of exploration funding and expenditures since the start of the new millennium and by significant new discoveries in mineral exploration.

Public financing raised on the Québec financial market in 2002 for carrying out exploration projects in Quebec reached $37.2 million, a 30% increase from funds raised in 2001. Compared with the preceding year, flow-through share issues increased by $4.6 million (+ 46%) while common shares and debentures gained $2.8 million (+ 14%). The revitalization of mining financing is therefore well under way and mining exploration should reap the benefits in the years to come.

Exploration and deposit appraisal expenditures rose for the second consecutive year to $111.2 million in 2002, an increase of $17.1 million (18%) since 2000 (**Table 13**). Québec continues to be the site of approximately 20% of the exploration and deposit appraisal expenditures in Canada and one

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[10] The Québec review of activities was prepared by Sylvain Lacroix, Pierre Marcoux, Pierre Doucet, Jean Désilets and Jocelyne Lamothe. For more information, the reader is invited to contact Mr. Lacroix by telephone at (418) 627-6296 (ext. 5534) or by e-mail at sylvain.lacroix@mrn.gouv.qc.ca.

TABLE 13. EXPLORATION FINANCING IN QUÉBEC, (1) AND EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (INCLUDING DIAMONDS) IN QUÉBEC, CANADA AND THE WORLD, 1997-2002

	1997	1998	1999	2000	2001	2002
			($ millions)			
QUÉBEC						
Flow-through share issues	22.9	12.3	5.9	10.2	10.0	14.6
Common share issues and debentures	. .	. .	. .	15.3	19.8	22.6
Exploration and deposit appraisal expenditures	173.3	127.1	113.5	94.1	102.9	111.2
For diamonds	2.6	2.5	1.2	7.3	7.5	14.7
CANADA						
Exploration and deposit appraisal expenditures	921.0	655.9	504.3	496.7	512.9	573.4
Québec's share of total Canadian expenditures	18.8%	19.4%	22.5%	18.9%	20.1%	19.4%
Exploration and deposit appraisal expenditures for diamonds	112.4	119.1	108.7	91.9	144.7	161.6
Québec's share of total Canadian expenditures for diamonds	2.3%	2.1%	1.1%	7.9%	5.2%	9.0%
WORLD						
World exploration expenditures (US$ millions)	5 200	3 700	2 800	2 600	2 200	1 900
Québec's share of total world expenditures	2.4%	2.4%	2.7%	2.5%	3.0%	3.7%
World exploration expenditures for diamonds (US$ millions)	284	301	256	223	199	234
Québec's share of total world expenditures for diamonds	0.6%	0.5%	0.3%	2.0%	2.0%	4.0%

Sources: Service de l'imposition et des données minières (Québec Department of Natural Resources); Natural Resources Canada: Metals Economics Group.

. . Not available

(1) Only amounts raised in Québec for projects in Québec are indicated.

of the few places in the world where such expenditures have been increasing for the past two years. In fact, worldwide exploration budgets have been falling steadily for five years, dropping from US$5.2 billion to US$1.9 billion. Consequently, Québec's share of world exploration capital increased from 2.4% to 3.7% between 1997 and 2002.

There has been significant interest in diamonds in Québec since the start of the millennium. After the announcement of the discovery of two diamondiferous kimberlites in the Otish mountains at the end of 2001, this interest was first manifested in claim acquisition activities. The acquisition of diamond claims significantly contributed to the 67 938 claims registered in 2002, as well as to the 22 875 claims registered over the first nine months of 2003. The number of active claims in Québec thus rose from 101 220 claims at the beginning of 2002 to 156 262 claims at the end of September 2003. On that date, active claims covered a total area of approximately 6.4 Mha. It should be noted that the new method of acquiring claims by map designation also contributed to the significant increase in the number of registered claims over the past two years.

Interest in diamonds was also reflected in the level of diamond exploration expenditures. In fact, diamond-related expenditures almost doubled in 2002 to reach close to $15 million, compared to slightly over $7 million in both 2000 and 2001 and an amount that fluctuated from $1.2 million to $2.6 million between 1997 and 1999. In 2002, Québec accounted for 9% of Canada's diamonds exploration and deposit appraisal expenditures and for 4% of the world's capital allocated to the search for them, both substantial increases over previous years.

Highlights of Off-Mine-Site Exploration and Deposit Appraisal

Québec continues to spark considerable interest in diamonds since the discovery of diamondiferous kimberlites in the Otish mountains by Ashton Mining of Canada Inc. and SOQUEM Inc. (*Société québécoise d'exploration minière* [Québec mining exploration corporation]) in 2001. These companies announced the discovery of three other kimberlite bodies on the Foxtrot property in 2003 (Renard 9 and 10 and Lynx). A group of nine kimberlites now make up the Renard cluster. The Lynx body, located 2 km west of Renard 65, forms a zone of dykes distinct from the Renard cluster. In November, Ashton Mining of Canada Inc. and SOQUEM Inc. confirmed that the analysis of 36.5 t of material from the four bodies (2, 3, 4 and 65) of the core area of the Renard cluster indicated a diamond content of 0.55 ct/t. This result does not take into account a diamond of at least four carats found in a Renard 65 drill core.

About 75 km to the south, Ditem Explorations Inc. and Pure Gold Minerals Inc. announced the discovery of two other kimberlite pipes (H-3 and H-4) on the Tichégami project. Dios Exploration Inc. also discovered three bodies of kimberlite rock by drilling on the Hotish project. Other companies have confirmed the presence of diamond-indicator minerals in the Near North region, including Majescor Resources Inc. (Portage and Gayot properties) and Dianor Resources Inc. (Wemindji sector).

About 20 companies took an active interest in 2003 in the exploration of nickel and platinum group elements (PGE) in the Cape Smith Belt on the Ungava Peninsula. The renewal of activity in this area follows the discovery in 2002 of several mineralizations by Canadian Royalties Inc. on the Expo-Ungava property, 15 km south of the Raglan mine. In April 2003, Canadian Royalties Inc. announced an indicated resource evaluation of the Mesamax deposit at 1.45 Mt grading 2.1% nickel, 2.7% copper, 1.0 g/t platinum and 4.2 g/t palladium. The company also announced over the course of the year the drilling discovery of the Tootoo zone (10.51 m grading 3.14% nickel, 2.56% copper and 2.6 g/t palladium) and of a new mineralized zone in the area of the Expo deposit (4.8 m grading 2.86% nickel, 1.46% copper and 3.44 g/t palladium). In September, Anglo American plc and its partner, Knight Resources Ltd., announced the discovery of new nickel-copper-PGE mineralized zones on the West Raglan property, 120 km west of the Raglan mine; one of the holes drilled yielded 14.75 m grading 3.04% nickel, 1.13% copper and 3.0 g/t palladium.

The Abitibi Belt continued to be the main region explored for gold. In the Cadillac sector, Agnico-Eagle Mines Ltd. continued exploring the Contact zone on the Lapa property, 10 km east of the LaRonde mine. In June, the company announced a 25% increase in the inferred resources of this deposit, which are currently evaluated at 4 Mt grading 8.5 g/t gold. West of the Lapa property, Queenston Mining Inc. intersected by drilling the extension of the Contact zone (11.5 m grading 3.7 g/t gold). Cambior Inc. announced the discovery at depth of two gold-bearing zones on the Westwood property, 2 km east of the Doyon mine: the North corridor in the extension of zones 1 and 2 of the Doyon mine and the Westwood corridor. The most significant results include grades of 12.1 g/t gold over 2.9 m for the North corridor and 8.1 g/t gold over 6.5 m for the Westwood corridor. In 2004, Agnico-Eagle Mines Ltd. should announce the findings of a new feasibility study for the Goldex project located near Val-d'Or.

Elsewhere in the Abitibi Belt, South-Malartic Exploration carried out over 15 000 m of drilling on the Croinor deposit, 70 km east of Val-d'Or, to re-evaluate resources. A 20 000-t bulk sampling program is the next step in the development of the Croinor deposit. Globex Mining Enterprises Inc. carried out a drilling program on the Duquesne Ouest property, 25 km north of Rouyn-Noranda, from which inferred resources were estimated at 665 000 t grading 11.4 g/t gold for the South, Fox, Shaft and Liz zones.

Aurizon Mines Ltd. continued exploring zones 118-120 discovered previously on the Casa Berardi property, east of the former West mine. Recent drilling confirmed the extension of the mineralization of zones 118-120 more than 300 m to the east and discovered four new gold-bearing zones in the extension of the Main zone. The company announced in June a recent inferred resource estimate of 1.7 Mt grading 6.1 g/t gold for the new zones 118 and 120. The Casa Berardi mine produced 690 000 oz of gold between 1988 and 1997; the mineral reserves announced previously in 2000 for the West mine stood at 6.9 Mt grading 6.7 g/t gold, amounting to approximately 1.5 million oz of gold.

North of the Selbaie mine, International Taurus Resources Inc. and Fairstar Explorations Inc. started deposit appraisal work with a view to developing the Fénelon deposit. The most recent resource estimate of a limited portion of the mineralized zone known to date includes both an indicated mineral resource of 49 550 t grading 11.24 g/t gold and an inferred mineral resource of 38 840 t grading 10.49 g/t gold, for a total of 31 000 oz of gold. Construction of the portal and the upper part of the 484-m ramp is complete.

In 2002, Virginia Gold Mines Inc., Noranda Inc. and Novicourt Inc. launched a MegaTEM airborne survey in northwestern Québec; this technology can detect polymetallic mineralizations to a depth of 250 m. Ten surveys covering an area of nearly 9400 km^2 have been carried out to date. In the fall, these companies announced the discovery of two polymetallic mineralized zones in felsic volcanic rocks as part of the MegaTEM project.

In the James Bay region, Eastmain Resources Inc. announced in May a recent estimation of mineral resources for the Eau Claire gold deposit located approximately 150 km east of James Bay and 50 km north of Némiscau. The new estimate includes an indicated mineral resource of 1.0 Mt grading 8.15 g/t gold and an inferred resource of 1.6 Mt grading 5.88 g/t gold, for a total of over 578 000 oz of gold. In January, Virginia Gold Mines Inc. and Cambior Inc. announced the drilling discovery of a new gold-bearing zone on the La Grande Sud property; a drill hole yielded 16.7 g/t gold over a 1.5-m interval. Also in the La Grande Belt, Virginia Gold Mines Inc. and its partner, GlobeStar Mining Corp., announced in April an initial resource evaluation of 200 000 t grading 14.5 g/t gold (Orfée zone) on the Poste Lemoyne property, 100 km east of La Grande Sud.

As well, in the Saguenay–Lac-Saint-Jean region, Virginia Gold Mines Inc. and SOQUEM Inc. carried out a drilling campaign on the Chute-des-Passes property; a drill hole yielded values of 1.03% nickel and 0.8% copper over 10.3 m. On the Côte-Nord (North Shore), Quinto Technology Inc. and SOQUEM Inc. reached an agreement on the deposit appraisal of nickel and graphite mineralizations on the Guéret property. Trenching carried out over the summer yielded an average of 24% graphitic carbon over 14 m in the South zone.

Mine-Site Exploration and Deposit Appraisal Highlights

In the Cadillac mining camp, Cambior Inc. successfully continued its intensive drilling program in the J zone of the Doyon mine. Inferred resources of the J zone are evaluated at 356 000 t grading 7.5 g/t gold; the driving of an access drift has been undertaken with a view to start mining this zone in 2005. At the Mouska mine, Cambior Inc. announced the 210-m deepening of the internal shaft to a total of 880 m, which will provide access to probable mineral resources of 142 000 t grading 15.4 g/t gold. This work will lead to a 10-month production stoppage in 2004. Agnico-Eagle Mines Ltd. continued exploring the North zone of the LaRonde mine; a feasibility study of the LaRonde II project, focussed on deep ore mining (3050 m), has begun and will be completed in 2004.

At the Beaufor mine, northeast of Val-d'Or, Richmont Mines extended three drifts to explore the extensions of zones B and C with a view to increasing ore reserves. North of Amos, Cambior Inc. and Aurizon Mines Ltd. undertook the 200-m deepening of the shaft of the Sleeping Giant mine to a total depth of 1060 m. This work will provide access to new probable resources (77 000 t grading 12.2 g/t gold) and inferred resources (192 000 t grading 10.3 g/t gold) discovered below the 785 level since 2001.

In the Lebel-sur-Quévillon region, Breakwater Resources Ltd. announced a 25% increase in the mineral resources of zone 97 of the Langlois mine. The resources of this mine, which has been closed since November 2000, stand at 3 323 000 t grading 10.8% zinc, 0.8% copper and 52 g/t silver. A new feasibility study carried out during the year gave no indication that the mine would re-open in the short term.

In the Chibougamau region, Campbell Resources Inc. announced an increase in the mineral resources of the West zone of the Joe Mann mine; an access drift has been driven with a view to developing this zone in 2004. Furthermore, Campbell Resources Inc. resumed its development work on the Copper Rand gold and copper project in October following the financial restructuring of the project. This work had been interrupted in June; the deepening of the main shaft is complete. Operations are expected to resume at the end of 2004.

Comparative Advantages and Recent Provincial Initiatives

Québec has had one of the most favourable mineral exploration investment climates in the world in the past five years. Here are the main factors contributing to the creation of Québec's excellent exploration investment climate.

A Rich and Diversified Mineral Potential on a Vast, Open and Little-Explored Territory

Because of the richness of its subsoil, Québec ranks second in Canada in terms of mineral production value. Its wealth of mineral resources is particularly diverse, as illustrated by the production of 30 mineral commodities in the province. Québec also ranks among the top 20 mining producers in the world for eight of these commodities, namely copper, zinc, iron, nickel, gold, niobium, ilmenite and titanium.

Discovery prospects are extremely attractive, as illustrated by the development of numerous major deposits in the past 100 years, including those of Raglan and LaRonde over the last decade. In the last three years, Québec was also the Canadian mining jurisdiction where the highest number (17) of promising showings were discovered, including 5 or 6 with mining potential, according to a recent Prospectors & Developers Association of Canada study of flow-through share financing.

Québec has a land area of more than 1.5 million km^2. Over 90% of Québec consists of Precambrian rocks, which are known worldwide for hosting many world-class deposits. Even after the recent wave of diamond claim acquisitions, the area of about 6.4 Mha covered by claims represents less than 5% of Québec's landmass; consequently, a vast area remains open to exploration. Furthermore, Québec is blessed with favourable geography and possesses well-developed infrastructure that provides ready access to its land by road, rail, water or air.

Abundant and Accessible Geoscientific Information

In Québec, the geoscientific data acquired by government and industry for over 100 years are found in SIGEOM, the geomining information system of Québec. It contains no fewer than 5500 publications from the Québec Ministère des Ressources naturelles, de la Faune et des Parcs (Department of Natural Resources, Wildlife and Parks) and 65 000 reports from mining companies, for a total of 2.2 million pages, 266 000 geological plans and maps, 6500 mineral occurrences, 130 000 diamond drill holes, and 12 million geochemical analysis results obtained from 600 000 samples. The value of the knowledge in this database is estimated at over $5 billion.

Québec's geoscientific database is easy to access, particularly with the *SIGÉOM à la carte* interface (www.mrn.gouv.qc.ca/mines/). SIGEOM allows all of its mining clientele to access and consult the data anytime, anywhere on the Internet, and to download them, customize them and order them through e-commerce.

The information in the database is continuously being updated and improved. Exploration and deposit appraisal work carried out by the industry of an annual value of close to $50 million is added to the existing database each year. As well, the results of new geoscientific work carried out by the government are added to the database each year. Over the past 10 years, the Québec Department of Natural Resources, Wildlife and Parks has carried out an annual average of $15 million in such work, i.e., one quarter of all Canadian expenditures allocated to this activity.

To considerably increase knowledge of the largely unexplored northern region of Québec, the Québec Department of Natural Resources, Wildlife and Parks has been a pioneer in Canada by initiating, in the mid-1990s, two important geoscientific data acquisition programs named Near North and Far North. A total of close to $35 million has been allocated so far to these two projects in order to map and to significantly increase the level of knowledge in a part of these two regions that covers more that a quarter of Québec's landmass.

In the 2003/2004 fiscal year, Géologie Québec will devote $5.9 million to its program of geoscientific inventories and studies. During the summer, 9 new geological maps and about 20 thematic studies were conducted in five regions of Québec.

This year, Géologie Québec is completing a 1:250 000-scale geological survey of the Far North, west of the Labrador Trough. Two new surveys (covering 30 000 km^2 of land) were carried out in the regions of Kogaluk Bay and Lake Minto, on the east shore of Hudson Bay. These inventories were accompanied by various studies focussed particularly on diamond indicator minerals, geochemistry, structural geology, and mineral deposits.

The James Bay area was the subject of two 1:50 000-scale geological surveys. The Olga Lake project, east of Matagami, continued for a second year and a new mapping project of the Grenville Front was started east of Chibougamau. There is a metallogenic component to each of these projects. A metallogenic study of the Mistassini Basin, initiated in 2002, also continued.

In the Abitibi region, Géologie Québec undertook a new geological survey along the Grenville Front, southeast of Lebel-sur-Quévillon. This survey was supplemented by a metallogenic study of the adjacent sector of Urban-Barry. In the Rouyn-Noranda region, a study to specify the mineral potential of the Blake River group was started. Another study focussing on the gold-bearing potential along the Porcupine-Destor fault was continued in the Duparquet sector; a 3D-modelling component was added to this study.

In the Grenville province, Géologie Québec continued its mapping project north of Mont-Laurier with a view to completing the geological synthesis of the Central Metasedimentary Belt. Studies focussing on nickel and copper potential were conducted in the Mauricie region. Finally, on the Côte-Nord, a geochemical survey of lake sediment was carried out north of Baie-Comeau in partnership with mining companies and local agencies.

Work in the Appalachians centred primarily on the Gaspé region and had for an objective the revision of the geological map and the study of copper-zinc-lead-gold-silver mineralization in sedimentary and volcanic environments. A ground-based gravimetric survey was also completed.

In the industrial minerals sector, Géologie Québec started an inventory of aggregates resources in the Laurentides wildlife preserve, north of Québec City, as well as a study on the rare metals potential of the James Bay area.

A Reliable, Modern Mining Regime

The Québec mining regime is based on the *Mining Act*, which came into force in November 2000, and is founded on the principle of free mining, i.e., universal access to the resource. Mining titles are now being obtained from map designations, according to predefined boundaries. Titles, together with exclusive rights to search for mineral substances (with the exception of sand, gravel, clay and other surficial deposits) and a guarantee to receive a mining title in case of a discovery, are awarded on a first-come, first-served basis. This approach has the advantage of being fast and simple; it also makes the claim indisputable by a third party and protects investments in the claim.

The average cost of acquiring a new designated claim of an average area of 50 ha is $80. This is a real financial boon to explorationists, since the former costs required for staking out and registering a similar 48-ha area (i.e., three former claims of 16 ha) amounted to over $500. Consequently, the acquisition of claims in Québec via map designation is, on average, close to seven times less expensive for the industry than the old method of groundstaking.

The Internet application GESTIM offers instantaneous, continuous, anytime and anywhere access to the registry of Québec mining titles at www.mrn.gouv.qc.ca/mines/titres/. GESTIM, Québec's mining title management system, enables users to consult and download mining title maps, designate and register mining exploration titles on-line, declare work, and pay fees through e-commerce.

One of the Lowest Net Costs of Exploration in the World

Québec offers several tax incentives that significantly reduce the net cost of exploration for mining companies in Québec and promote the financing of their activities (www.mrn.gouv.qc.ca/mines/fiscalite/index.jsp).

Under the *Taxation Act*, the Québec government introduced a new tax measure in 2001: the refundable tax credit for resources. This tax credit is available to companies with eligible expenses in Québec as of March 29, 2001. The tax credit amounts to, since June 12, 2003, 30% for non-producing (junior) companies and 15% for producing (senior) companies. These rates are higher (33.75% and 18.75%, respectively) when exploration is carried out in Québec's Near North and Far North regions. Producing companies in Québec may also benefit from an additional non-refundable component in the form of a tax credit of as much as 26.25-30%, which can be applied to reduce their income tax or capital tax payable. In short, producing companies can be refunded up to 45% of their exploration expenses in Québec.

In addition, the credit on duties refundable for losses provided under the *Mining Duties Act* is equal to 12% of the lesser of the amount of annual loss or exploration, deposit appraisal and mine development expenses. The credit is increased to 15% if the exploration expenditures have been incurred in Québec's Near and Far North and the refundable tax credit for resources has not been claimed for the expenditures. The credit on duties refundable for losses is non-taxable and does not reduce the amount of exploration expenses that a mining company can claim under the *Mining Duties Act* and the *Taxation Act*.

An additional 50% deduction of qualifying exploration expenses may be granted under the *Mining Duties Act*, up to a limit of 50% of annual profit. Eligible expenses include surface exploration and underground drilling work performed on land that is not under a mining lease or mining concession or where no extraction work has been carried out in the previous five fiscal years.

Access to Public Financing, Venture Capital and Exploration Partners

The Québec *Taxation Act* enables a Québec taxpayer (individual) to claim a tax deduction up to 131.25% of his or her investment in flow-through shares used to finance surface mining exploration in Québec. Considering provincial and federal tax advantages, the net cost of a $1000 investment in flow-through shares issued after June 12, 2003, amounts to approximately $330 for an individual in Québec who is subject to the highest marginal tax rate. Thus, the flow-through share regime in Québec is the most generous in Canada, since the average net cost in the rest of Canada is $444. The flow-through share regime was extended in 2003 to December 31, 2004.

Several venture capital funds invest in companies involved in mineral exploration in Québec. The mission of SIDEX (*Société d'investissement dans la diversification de l'exploration* [exploration diversification investment corporation]) (www.sidex.ca), a limited partnership created in 2001, is to invest in the capital stock of companies with exploration projects that, at term, will lead to the diversification of the Québec mining industry, both in terms of commodities extracted and in terms of mineral-producing regions. The initial capital for SIDEX was set at $50 million over five years and was provided by its two limited partners, the Québec government (70%) and the Solidarity Fund QFL (30%). Since its beginning in October 2001, SIDEX has invested a total of $16.2 million by making over 50 investments in approximately 40 mining companies.

SIDEX intends to limit to 10% its participation in the capital stock of companies in which it invests, except under exceptional circumstances. It can invest in companies headquartered outside Québec subject to the condition that the entire amount of its investment be directed toward Québec. Where SIDEX invests in a company, the latter is not prohibited from claiming the refundable tax credit (for exploration costs).

The mission of limited partnerships SODÉMEX (*Société de développement des entreprises minières et d'exploration* [mining and exploration company development corporation]) and SODÉMEX II, created by Capital d'Amérique CDPQ and SOQUEM, is to participate in the development of the mining industry in Québec. This mission is accomplished through investments ranging from $100 000 to $500 000 in junior exploration companies and mining producers with activities in Québec whose market capitalization is small (below $125 million), and in Québec exploration companies involved in exploration activities outside the province.

In 2001, the two limited partnerships took part in primary market financing via prospectus, private placements and the exercise of stock purchase warrants; this financing totalled $1.3 million and involved 15 companies. As of December 31, 2001, the total capital invested by the limited partners increased from $32 million to $44 million following the transfer of shares of mineral producers that were owned by Capital d'Amérique CDPQ. The investment portfolio of these companies is managed by Gestion SODÉMEX, the president of which is Denis Landry (dlandry@sodemex.com).

The Solidarity Fund QFL owns a mining portfolio that includes exploration companies and mining producers (www.fondsftq.com/eng/index.asp), while the Nord-du-Québec QFL Regional Solidarity Fund and the Abitibi-Témiscamingue QFL Regional Solidarity Fund also invest in the mineral exploration sector. The majority of investments are directed toward bringing new orebodies into production or helping the growth of Québec mining producers, with the remainder being allocated primarily to working capital support for exploration companies.

The SDBJ investment fund was created in 2003 by the *Société de développement de la Baie-James* (James Bay Development Corporation) to stimulate mining in the James Bay region. To this end, the fund will be able to make private placements of $0.1 million to $0.5 million, up to a total of $4 million, for funding publicly traded mining companies involved in exploration on its territory.

SOQUEM Inc. and its partners annually commit over $12 million (2002) to off-mine-site exploration work in Québec. SOQUEM contributes to the development of mineral resources and the Québec mining industry by favouring a partnership approach in which it provides financial contributions, technical and professional expertise, and a thorough knowledge of the land and the current legislation governing the Québec mining sector.

Finally, the Québec Department of Natural Resources, Wildlife and Parks intends to encourage the participation of Aboriginal communities in the Near and Far North in the development of the mineral potential of this vast land. To do this, a $0.3 million budget was granted in 2003/2004 to each of the following Aboriginal mining funds: the Cree Mineral Exploration Board and the *Fonds d'exploration minière du Nunavik* (Nunavik mining exploration fund); in addition, $0.05 million was granted to the *Fonds minier innu Nitassinan* (Nitassinan Innu mining fund).

2.6 ONTARIO[11]

Ontario, Canada – The Future of Mining

Ontario's mining industry continues to outperform all other Canadian provinces and territories in terms of exploration investment. The province is forecasting $212.6 million, or 31%, of Canada's total exploration expenditures in 2003. This represents a 53% increase from Ontario's already impressive figures ($139.0 million) in 2002. Strong investor interest in gold and a recent upswing in base- and precious-metal prices should contribute to increased exploration expenditure levels throughout 2004.

The province continues to build on its standing as one of the world's premier jurisdictions for new mineral investment. The industry's confidence in the future and its firm belief in Ontario's potential is testimony to the wealth of exciting mining investment opportunities.

Overview

Preliminary estimates for 2002 indicate that the value of Ontario's mineral production in the three commodity groups (metals, nonmetals, and fuels) totalled $5.86 billion. This represents an increase of 1.5% from the $5.77 billion reported in 2001. The contribution of each commodity group to the 2002 Ontario total was as follows: metallic minerals, $3.52 billion (60.0%); nonmetallic minerals, $2.23 billion (38.2%); and fuels, $106 million (1.8%). In 2002, Ontario produced 34% of Canada's metallic minerals and 29% of Canada's nonmetallic minerals (including structural materials).

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[11] The Ontario review of activities was prepared by Peter Cashin. For more information, the reader is invited to contact Mr. Cashin by telephone at (705) 670-5620 or by e-mail at peter.cashin@ndm.gov.on.ca.

The five highest-value metallic minerals produced during 2002 were nickel ($1240 million), gold ($1181 million), copper ($467 million), platinum group metals ($378 million), and zinc ($123 million). These metals represent 58% of the total value of Ontario's mineral production.

In 2002, Ontario yielded 66% of Canada's nickel production, 51% of its gold production, 33% of its copper production and 84% of its platinum group metals production.

Ontario continues to retain its position as the lead Canadian province in the value of non-fuel mineral production as the 2002 rise in the value of gold and nickel helped to offset a decline in platinum group metals. The province accounted for 32% of Canadian non-fuel mineral production.

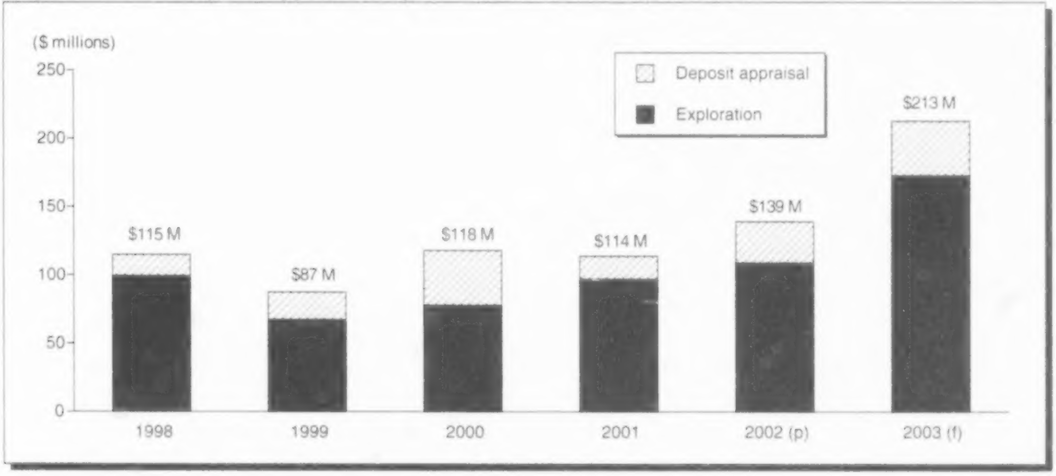
Spending intentions for 2003 indicate that Ontario leads all Canadian provinces and territories in exploration and deposit appraisal expenditures with 31% of Canada's total expenditures (**Figure 21**).

Final exploration and deposit appraisal expenditures for the year 2001 totalled $113.6 million. Preliminary estimates for 2002 showed a significant increase of 23% to $139.0 million and another dramatic increase to $212.6 million is forecast for 2003.

Preliminary figures for 2002 indicate a total of $364.8 million was spent on mineral exploration and mine complex development in Ontario. Total expenditures by activity in 2002 were $108.8 million (30%) for exploration, $30.2 million (8%) for deposit appraisal, and $225.8 million (62%) for mine complex development. Forecasts for 2003 mineral exploration and deposit appraisal expenditures, including mine complex development, are estimated at $439.6 million. The increase is attributable to higher exploration and mine complex development expenditures.

In 2002, spending by Ontario's junior mining companies increased by more than 28% to $51 million while spending by Ontario's senior mining companies increased by more than 19% to $88 million from 2001. Forecasts for 2003 indicate that spending by Ontario's junior mining companies will increase by more than 26% from 2002 to $65 million and that spending by Ontario's senior mining companies will increase by almost 69% to $148 million. Ontario's senior mining companies account for less than 70% of Ontario exploration expenditures, a decline from over 75% in 1999 and 2000.

Figure 21
Exploration and Deposit Appraisal Expenditures in Ontario, 1998-2003



Sources: Ontario Ministry of Northern Development and Mines; Natural Resources Canada.
(f) Forecast; (p) Preliminary.

Gold continues to be the most sought-after commodity in Ontario despite the increasing activity around diamonds. Much of the increase in exploration expenditures during 2002 resulted from more activity around existing gold mines and known deposits.

A total of 180 073 mining claims were in good standing in Ontario at the end of 2002, a slight decrease from 2001.

Assessment work in Ontario increased by more than 50% in 2002 as the value of the work filed climbed from $28.0 million in 2001 to $42.4 million in 2002.

Spotlight on Gold

The increase in the world price of gold to over US$400/oz in 2003 has raised the investment profile of many of the mining companies active in Ontario, particularly those holding strong gold property portfolios. This increased investor interest is expected to result in a significant increase in exploration activity for this precious metal in Ontario in 2004.

For more than a century, Ontario has been a significant producer of gold and is host to many of the world's premier gold mines. A recent compilation of historical Ontario gold statistics indicates that:

- 150 million oz of gold have been produced by 230 Ontario mines;
- in 2002, 15 active gold mines (**Figure 22**) produced 2.45 million oz; and
- there are approximately 265 active grass-roots to advanced exploration/mine development gold projects under way across the province.

With a sustained gold price at or greater than present levels, something that has not been seen since 1988, there is a strong likelihood this year that:

- as many as nine advanced exploration projects could be brought into production;
- numerous low-grade and polymetallic deposits (i.e., iron oxide-copper-gold deposits) could be re-evaluated;
- major increases in exploration and development work in established gold camps (i.e., Timmins, Kirkland Lake, Red Lake, Hemlo) could take place;
- past-producing gold camps (i.e., Beardmore-Geraldton, Pickle Lake, Detour Lake, western Wabigoon) could be the focus of re-evaluation;
- active exploration could occur in the remote frontier (Far North) areas of the province (i.e., Sachigo, Fort Hope, Burntbush, Stull Lake).

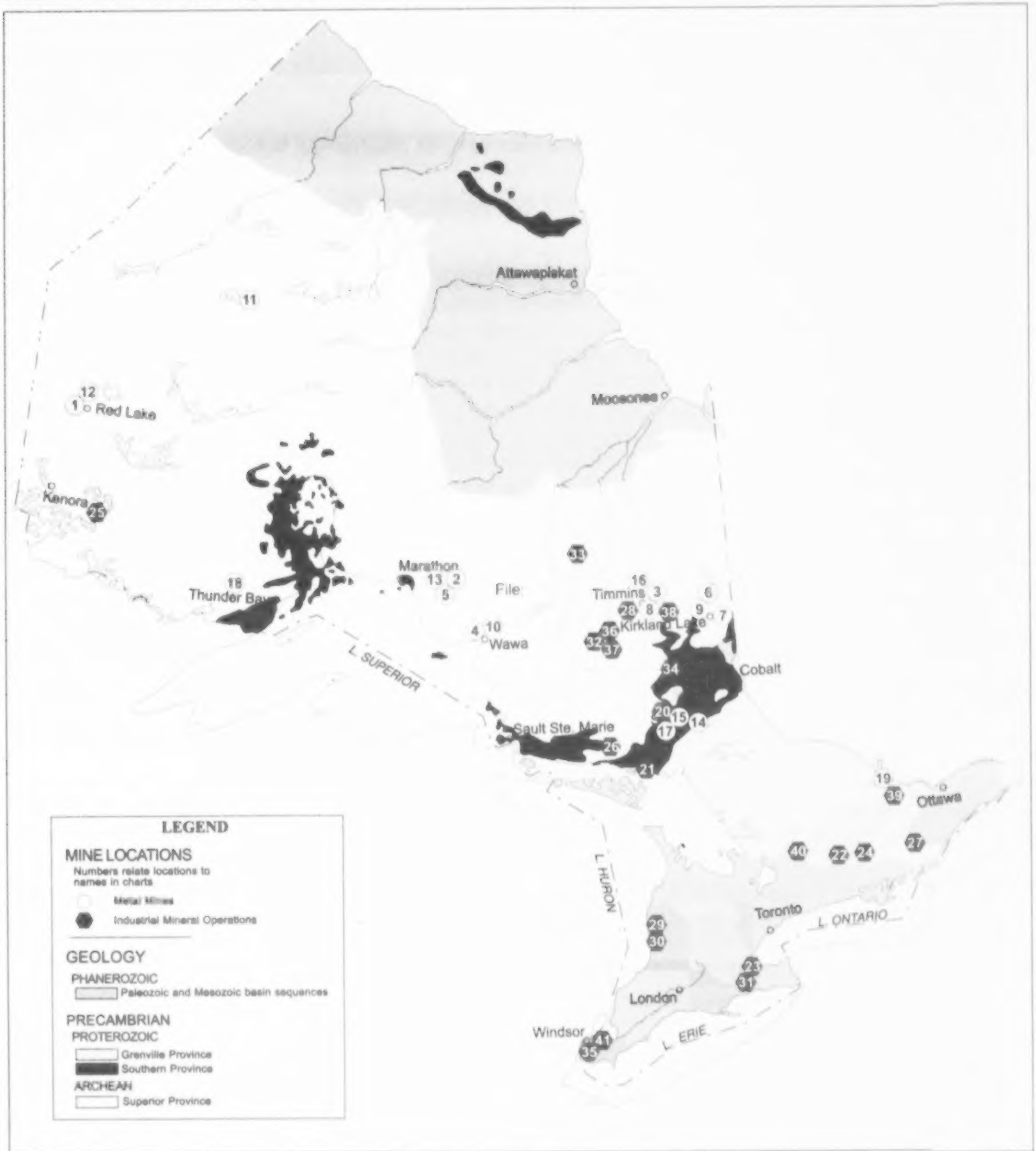
2003 Exploration Highlights - Northeastern Ontario

Timmins District

GOLD

Band-Ore Resources Ltd. returned to the Thorne property in Thorneloe Township and reported intersecting two new gold zones. The No. 14 zone returned gold values up to 11.59 g/t gold over 2.1 m. The Red Porphyry zone yielded anomalous gold values up to 1.1 g/t gold over 31.5 m (www.band-ore.com).

Figure 22
Active Mines in Ontario, 2003



Numbers refer to locations on map above.

Figure 22 (cont'd)

Gold Mines

1. Campbell Mine	Placer Dome Canada Ltd.
2. David Bell Mine	Teck Cominco Limited, Barrick Gold Corporation
3. Dome Mine	Placer Dome Canada Ltd.
4. Eagle River Mine	River Gold Mines Ltd.
5. Golden Giant Mine	Newmont Mining Corporation of Canada Limited
6. Holloway Mine	Newmont Mining Corporation of Canada Limited
7. Holt-McDermott Mine	Barrick Gold Corp.
8. Hoyle Pond Mine	Kinross Gold Corporation
9. Macassa Mine	Kirkland Lake Gold Corporation
10. Mishi Mine	River Gold Mines Ltd.
11. Musselwhite Mine	Placer Dome Canada Ltd
12. Red Lake Division	Goldcorp Inc.
13. Williams Mine	Teck Cominco Limited, Barrick Gold Corporation

Base-Metal Mines (nickel, copper, zinc, lead)

14. Fraser Mine	Falconbridge Ltd.
Lockerby Mine	Falconbridge Ltd.
Onaping/Craig Mine	Falconbridge Ltd.
Lindsley Mine	Falconbridge Ltd.
15. Copper Cliff North Mine	INCO Ltd.
Copper Cliff South Mine	INCO Ltd.
Creighton Mine	INCO Ltd.
Garson Mine	INCO Ltd.
Gertrude Mine	INCO Ltd.
Lower Coleman Mine	INCO Ltd.
McCreedy East Mine	INCO Ltd.
Stobie Mine	INCO Ltd.
16. Kidd Creek Mine	Falconbridge Ltd.
17. McCreedy West Mine	FNX Mining Company Inc., Dynatec Corporation

Platinum Group Metals Mines

18. Lac des Iles Mine	North American Palladium Ltd.

Other Metal Mines (magnesium, calcium, strontium)

19. Timminco Metals	Timminco Ltd.

Industrial Mineral Operations

20. AMP Quarry (carbonatite)	Agricultural Mineral Prospectors Inc.
21. Badgeley Island Quarry (silica)	Unimin Canada Ltd.
22. Blue Mountain Mine (nepheline syenite)	Unimin Canada Ltd.
23. Caledonia No. 3 Mine (gypsum)	Georgia-Pacific Canada Ltd.
24. Canada Talc Division (talc)	Highwood Resource Ltd.
25. Crystal Quartz Quarry (silica)	Crystal Quartz Canada Inc.
26. Deagle Twp. Quarry (silica)	Rapier Resources Inc.
27. Elgin Quarry (silica)	Arriscraft International Inc.
28. Fripp Quarry (silica)	Great White Minerals Ltd.
29. Goderich Brine Field (salt)	Sifto Canada Inc.
30. Goderich Mine (salt)	Sifto Canada Inc.
31. Hagersville Mine (gypsum)	CGC Ltd.
32. Horwood Mine (serpentine)	Hedman Resources Ltd.
33. Kapuskasing Phosphate Operations	Agrium Inc.
34. North Williams Mine (barite)	Extender Minerals of Canada Ltd.
35. Ojibway Mine (salt)	The Canadian Salt Company Limited
36. Penhorwood Mine (talc)	Luzenac Inc.
37. Penhorwood Quarry (silica)	Roseval Silica Inc.
38. Shaw Township Quarry (silica)	Nortem Mining and Exploration Inc.
39. Tatlock Quarry (calcium carbonate)	OMYA (Canada) Inc.
40. Vermiculite Mine (vermiculite)	Regis Resources Inc.
41. Windsor Brine Field (salt)	The Canadian Salt Company

Source: Ontario Ministry of Northern Development and Mines.

A 10 000-m diamond drilling program is under way at Lake Shore Gold Corp.'s Timmins Gold project in Bristol Township near Timmins. The property was optioned from Holmer Gold Mines Limited. The best intersection returned 7.5 g/t gold over 20.36 m from the Ultramafic zone. Indicated mineral resources are 422 000 t grading 13.68 g/t gold and 890 000 t grading 6.4 g/t gold (www.lsgold.com and www.holmergold.com).

The Porcupine Joint Venture continued to explore its Timmins holdings. A feasibility study and permitting are under way for the proposed Pamour superpit, which is targeted for production in early 2005. The proposed pit contains a mineral resource of approximately 45 Mt containing up to 54 million g of gold (www.placerdome.com and www.kinross.com).

Work on the Davidson Tisdale property of Vedron Gold Inc. and Northcott Gold Inc. consisted of an initial 25- to 30-hole diamond drilling program to test the existing gold resource of the Main zone to the 550-foot level. The Main zone remains open below 550 feet where exploration drilling is planned. Significant results from the initial drilling include 14.4 feet grading 1.12 oz/ton gold, 18.4 feet grading 0.44 oz/ton gold, 7.2 feet grading 0.35 oz/ton gold, and 5.6 feet grading 0.28 oz/ton gold (www.vedron.com).

NICKEL-COPPER-COBALT-PGE

Falconbridge Limited announced that it has the appropriate government approvals to proceed with its Montcalm nickel mine project located in Montcalm Township, 70 km west-northwest of Timmins. Production should commence early in 2005. The Montcalm project has an estimated resource of 7 Mt of nickel-copper sulphide ore, of which an estimated 5.1 Mt grading 1.46% nickel and 0.7% copper are mineable (www.falconbridge.com).

DIAMONDS

De Beers Canada Exploration Inc. is conducting a feasibility study on its Victor project, located 90 km west of the community of Attawapiskat. The study includes core and bulk sampling programs on three kimberlites in close proximity to Victor: Tango Extension, Delta and India (www.debeerscanada.com).

Pele Mountain Resources Inc. has entered into an option and joint-venture agreement with De Beers Canada Exploration Inc. related to Pele's Festival property located north of Wawa. De Beers has completed an airborne geophysical survey and mapping of the occurrences and is preparing to collect bulk samples this fall (www.pelemountain.com).

COPPER-ZINC-SILVER

Spider Resources Inc. and KWG Resources Inc. further explored a volcanogenic massive sulphide (VMS)-style base-metal discovery at their McFaulds Lake project on the western edge of the James Bay Lowlands, 310 km by air north of Nakina. There are three separate sites with similar mineralization on the property. The best drill intersection to date graded 0.51% copper, 4.83% zinc, 0.07 g/t gold and 2.73 g/t silver over 25.75 m followed by a copper-rich section of 1.50% copper, 0.12% zinc, 0.32 g/t gold and 8.47 g/t silver over 7.95 m (www.spiderresources.com and www.kwg-resources.com).

INDUSTRIAL MINERALS

Niocan Inc. acquired the Argor Carbonatite property near Moosonee from Barrick Gold Corp., James Bay Columbium Ltd. and Exall Resources Ltd. Exploratory and detailed drilling, totalling 47 625 feet in 85 holes, was completed in outlining the deposit to a depth of 900 feet. The Argor Carbonatite contains 63 million tons of carbonatite grading 0.52% Nb_2O_5, including a high-grade section containing 10 000 tons per vertical foot grading 0.82% Nb_2O_5. The deposit is still open at depth and the 6388-acre property has not been fully explored (www.niocan.com).

Kirkland Lake District

GOLD

Apollo Gold Corporation is completing a 70 000-m drill program at the Black Fox project (former Glimmer mine) in Hislop Township east of Matheson. New ore shoots have been outlined along a strike length of 305 m and mineralization is open in all directions. The best drill intersections obtained to date returned 9.5 m of 18.87 g/t gold, 3.3 m of 39.69 g/t gold and 8.8 m of 22.92 g/t gold (www.apollogold.com).

International KRL Resources Corp. completed 12 diamond drill holes at the Golden Sylvia iron formation zone in Macmurchy Township, Shining Tree area. The company intersected multiple gold zones including 6.1 m at 3.32 g/t gold, 2.2 m at 6.75 g/t gold, 0.4 m at 21.05 g/t gold and 2.3 m at 4.12 g/t gold (www.krl.net).

Young-Davidson Mining Limited drilled the Matachewan gold project in Powell Township. Three new gold zones were discovered. One is immediately southwest of the Matachewan Consolidated No. 3 shaft with the best intersection grading 0.10 oz/ton gold over 114.5 feet. The other is 1000 feet east of the No. 3 shaft with the best intersection grading 0.17 oz/ton gold over 3.0 feet. The third discovery, referred to as the "Sheriff" zone, was intersected west of the Young-Davidson orebody grading 2.63 oz/ton gold over 5.0 feet (www.youngdavidson.com).

Kirkland Lake Gold Inc. completed surface and underground exploration on the new "D" zone just east of the Macassa No. 3 shaft. It currently contains indicated resources of 83 000 oz of gold. Overall, reserves and resources in all categories at the Macassa mine are 4.4 million tons grading 0.35 oz/ton, or containing 1 576 300 oz of gold. A $21 million development program was announced (www.klgold.com).

Queenston Mining Inc. drilled several of its properties in the Kirkland Lake area. Diamond drilling on the Anoki South zone in Gauthier Township intersected two mineralized zones grading 7.2 g/t gold over 1.5 m and 3.3 g/t gold over 4.9 m. Three gold discoveries were made along the North Break and a new gold zone was also discovered in Teck Township on the Amalgamated Kirkland property. Drill programs were also carried out at Vigrass and Gull Lake near Kirkland Lake and on Lake Abitibi (www.queenston.ca).

Tom Exploration Inc. diamond drilled the "J" zone in Munro Township, 16 km east of Matheson. Drilling intersected seven gold zones with the best intersection of 12.2 g/t gold over 4.7 m (www.tomexploration.com).

NICKEL-COPPER-COBALT-PGE

Mustang Minerals Corp. discovered a new nickel-bearing zone in komatiite rocks in Bannockburn Township west of Matachewan. Over the length of the exposure, grab samples from the massive sulphide zone mostly contain between 3.0% and 4.85% nickel, and samples from the adjacent disseminated zone contain between 0.19% and 0.98% nickel (www.mustangminerals.com).

DIAMONDS

Sudbury Contact Mines Ltd. completed drill programs on three kimberlite pipes on its Timiskaming diamond project, located near the town of New Liskeard. The 95-2 pipe demonstrated large tonnage potential and good diamond recoveries. A 500- to 700-t mini-bulk sample was taken at the 95-2 pipe in the fall of 2003 (www.sudburycontact.com).

COPPER-ZINC-SILVER

Wallbridge Mining Company Limited is exploring for VMS-style deposits in Ben Nevis and Clifford townships, 30 km northeast of Kirkland Lake. Diamond drill hole WBN-003, near the former Canagau mine, intersected 7.14 g/t gold and 5.48% zinc over 3.0 m (www.wallbridgemining.com).

Sudbury District

NICKEL-COPPER-COBALT-PGE

Falconbridge Limited is drilling a deep pilot hole at the Nickel Rim South project in Maclennan Township near Sudbury. An exploration shaft and underground development are planned to further explore inferred resources estimated at 6.3 Mt grading 1.7% nickel, 3.4% copper, 0.03% cobalt, 2.2 g/t platinum, 2.5 g/t palladium and 1.5 g/t gold (www.falconbridge.com).

FNX Mining Company Incorporated/Dynatec Corporation at the McCreedy West project, located in Levack Township in the Sudbury area, re-opened a ramp and reconditioned underground workings. Measured and indicated reserves at McCreedy West/Levack are 6.3 million tons grading 1.9% nickel and 0.8% copper, and 0.7 million tons grading 0.4% nickel, 2.6% copper and 5.49 g/t total platinum metals (TPM). The inferred resource consists of 1.3 million tons grading 1.9% nickel and 0.8% copper. The companies also completed 18 559 m of diamond drilling at the Norman project. The best hole on the property to date graded 13% copper, 1.0% nickel and 8.1 g/t TPM over 34.9 m (www.fnxmining.com).

Pacific North West Capital Corporation/Anglo American Platinum Corporation Limited conducted a 40 000-m diamond drilling program at their River Valley project in Dana Township. At the Dana Lake South deposit, DDH DL-154 intersected the highest grade palladium-platinum intersection to date, returning 5.02 g/t TPM over 47.0 m. Further south, a new discovery, the Varley showing, assayed up to 10 g/t TPM at surface. Follow-up drilling at the site returned 1.52 g/t TPM over 73.0 m, including 2.2 g/t TPM over 23.0 m (www.pfncapital.com).

Wallbridge Mining Company Limited announced the discovery of high-grade platinum-palladium footwall mineralization on its Wisner property, North Range, in the Sudbury Igneous Complex. Two styles of mineralization occur, one sulphide-bearing and the other very low in sulphide content. The latter graded up to 15.81 g/t TPM over a channel sample length of 0.4 m. Further work on the property is planned (www.wallbridgemining.com).

Sault Ste. Marie District

IRON OXIDE-COPPER-GOLD

Amerigo Resources Ltd. conducted a four-hole diamond-drilling program (992 m) on the Island Copper property in the Batchewana area, which resulted in intersections of 1.5% copper and 0.2 g/t gold over 8 m, and 4.4% copper and 0.5 g/t gold over 2 m. The program tested the depth and extent of previously delineated copper-gold mineralization. Also, at the company's Coppercorp property, prospecting returned assays up to 46% copper, 121 g/t silver and 19.5 g/t gold (www.amerigoresources.com).

2003 Exploration Highlights - Northwestern Ontario

Red Lake District

GOLD

Goldcorp Inc. reported the deepest multiple-ounce intersection yet encountered on the High Grade zone, grading 72.4 g/t gold over 14.63 m at a depth of 2184 m. This is 4.5 m below the planned bottom of the new shaft No. 3, slated to be completed before the end of 2006 (www.goldcorp.com).

Placer Dome (CLA) Inc. drilled approximately 20 000 m on its Madsen Option property, southwest of Red Lake. Results include 21.10 g/t gold over 1.55 m and 17.81 g/t gold over 4.24 m. Placer Dome can earn a 55% interest in the property from Claude Resources Inc. by spending $8.2 million prior to the end of 2004 and by delivering a bankable feasibility study within the following two years (www.placerdome.com and www.clauderesources.com).

Rubicon Minerals Corporation completed 12 558 m of drilling on its McFinley gold project yielding significant intersections of 48.0 g/t gold over 1.0 m in the MAC-1 zone and 9.9 g/t over 0.9 m in the "D" Vein. Both zones are open along strike and at depth. Rubicon has raised $8 million to finance its Canadian exploration projects (www.rubiconminerals.com).

Planet Exploration Inc. and Goldcorp Inc. completed induced polarization and airborne geophysical surveys as well as 6618 m of diamond drilling to follow up on its recent high-grade gold discovery on the Sidace Lake, northeast of Red Lake. The partners tested a sericite schist zone containing high background antimony, arsenic and mercury that assayed 5.36 g/t gold over 36.4 m, including a high-grade portion of 11.29 g/t gold over 8.5 m (www.planetexploration.info).

Wolfden Resources Inc. and Placer Dome (CLA) Ltd.'s Phase II drilling, targeting extensions of the Green Altered Zone (GAZ) gold horizon, has led to the discovery of a second high-grade gold zone on the East Bay gold property, northeast of Red Lake. The results from the first hole drilled to test this target, EB03-37, intersected 21.45 g/t gold across 4.3 m. This new zone is located approximately 400 m from the GAZ gold prospect at East Bay (www.wolfdenresources.com).

Thunder Bay North District

GOLD

Kodiak Exploration Limited initiated a diamond drill, mapping, prospecting and sampling program on the Lincoln gold property, northwest of Geraldton. Results of up to 1.43 g/t gold over 30.4 m and 17.29 g/t gold over 2.98 m were returned from channel sampling (www.kodiac-resources.com).

Slam Exploration Ltd. and Eastmain Resources Inc. announced that their drilling program on the Reserve Creek gold property near Fort Hope has extended the depth of known gold mineralization in the Williamson A and B zones. Drilling returned 40.9 g/t gold over 0.50 m and 7.73 g/t gold over 4.1 m (www.slamexploration.com and www.eastmain.com).

Landore Resources Inc. continued exploration on its Junior Lake and Miminiska Lake properties in the Armstrong and Fort Hope areas, respectively. A new gold zone, returning up to 11.9 g/t gold in grab samples, was discovered at Junior Lake. At Miminiska Lake, gold mineralization was intersected and included 40.2 g/t gold over 2.1 m and 9.7 g/t gold over 4.3 m (www.landore.com).

Thunder Bay South District

GOLD

Freewest Resources Canada Inc. reported grab samples assaying up to 10.85 oz/ton gold, 72 g/t silver, 5.2% lead and 3% zinc from the Larose property, west of Thunder Bay. Stripping has exposed the mineralized zone for more than 1.9 km along strike (www.freewest.com).

ValGold Resources Ltd. conducted diamond drilling on the Tower Mountain project, west of Thunder Bay, and intersected 5.40 g/t gold over 7.5 m, including a higher-grade section assaying 11.8 g/t gold over 3.0 m. Additional stripping, trenching and sampling were conducted during the field season and a second drill program has recently been initiated (www.valgold.com).

RJK Explorations Ltd. announced a new gold discovery on the Wedge property, west of Thunder Bay. Hole WGE-03-01 returned 5.89 g/t gold over 3.0 m. Diamond drilling is currently ongoing on the property (www.kasnergroupco.com).

NICKEL-COPPER-COBALT-PGE

Prospecting by G. and M. Gionet has extended the Moshkinabi sulphide zone near Manitouwadge. Stripping and trenching have exposed nearly massive sulphide mineralization for more than 100 m along strike. Grab samples have assayed as high as 14.15% copper, 0.91% nickel, 3.04 g/t palladium, 0.54 g/t platinum and 0.20 g/t gold. Options are pending; the property has never been diamond drilled.

COPPER-ZINC-SILVER-GOLD

Canadian Golden Dragon Resources Ltd. has discovered new gold zones and has extended a base-metal-mineralized, chert-exhalative horizon 400 m to the west on the Vanguard project, near Shebandowan. Grab samples assayed up to 16.5 g/t gold from quartz-pyrite veins in a carbonatized, magnetic zone that parallels the chert horizon. Diamond drilling on the West Vanguard zone assayed up to 2.33% copper and 4.26% zinc, and drilling on the East Vanguard zone returned 2.14 g/t gold, 43.4 g/t silver, 2.73% copper and 3.49% zinc over 6.6 m.

Kenora District

Metalore Resources Ltd. acquired the Cedartree Lake property, southeast of Kenora, from Avalon Ventures Ltd. in August 2002. An initial drill program yielded an intersection of 14.2 m grading 33.2 g/t gold. A follow-up drill program was initiated in September 2003; results are pending (www.metaloreresources.com and www.avalonventures.com).

Houston Lake Mining Inc. conducted line cutting, stripping, trenching, and geophysical and geological surveys on its West Cedartree gold project, southeast of Kenora. Channel sampling of the Angel Hill gold zone returned up to 7.07 m grading 13.78 g/t gold. Houston Lake is currently conducting a 1000-m drill program (www.houstonlakemining.com).

Amador Gold Corp. acquired the KPM property, west of Kenora, in late 2002. A diamond drill program, initiated in May, intersected 1.6 m grading 3.61 g/t gold. The company's revised resource estimate stands at 1.096 Mt grading 6.63 g/t gold (indicated) and 832 000 t grading 5.63 g/t gold (inferred). A winter drill program is currently being conducted (www.amadorgoldcorp.com).

2003 Exploration Highlights - Southern Ontario

Limerick Mines Ltd., a new mining company, reports a new resource figure of 4 million tons grading 0.8% nickel, 0.25% copper and 0.05% cobalt for the company's Limerick copper-nickel deposit south of Bancroft. Further evaluation and exploration of the property will begin in early 2004.

Lydia Diamond Exploration of Canada Ltd. reported that 19 clear, white and coloured diamonds have been recovered from till and bedrock sampling on the company's unpatented mining claims south of Bancroft. The largest diamond recovered had dimensions of 0.63 x 0.46 x 0.32 mm (www.lydiadiamonds.ca).

2.7 MANITOBA[12]

Overview

Exploration and Development

Preliminary estimates for exploration and deposit appraisal expenditures in Manitoba for 2003 are $30.0 million, comparable to the $29.9 million spent in 2002. The resurgence and stabilization in the price of gold above US$300/oz in 2002 resulted in a dramatic increase in exploration spending for the yellow metal in Manitoba in 2003. However, the province's proven potential for hosting world-class copper-zinc and nickel deposits continued to account for the bulk of mining exploration-related expenditures.

The total area of mining claims, exploration permits, special exploration permits and mineral exploration licences in 2002 was 2 464 233 ha, an increase from 2 052 604 ha in 2001 and 1 832 577 ha in 2000. The total area of mineral dispositions and leases in good standing at the end of 2002 was 2 621 219 ha, compared to 3 667 145 ha in 2001 and 2 757 482 ha at the end of 2000. Surface exploration diamond drilling in 2002 was 78 346 m, down slightly from 78 925 m in 2001.

BASE METALS

Hudson Bay Mining and Smelting continued with the final phase of the 777 Project, the development of the 777 mine. The $400 million project, which commenced in 2000, consisted of six components, including expansion and upgrading projects at the Flin Flon metallurgical plant and development of two new underground mines. Sinking of the new 1530-m shaft at the 777 mine in Flin Flon was completed in 2002. Lateral development to the ore lenses was under way throughout 2003 and full production of 1 Mt/y is expected by 2004. The 777 deposit contains mineable reserves and resources of 14.5 Mt grading 4.56% zinc, 2.5% copper and precious metals. Hudson Bay Exploration and Development continued to drill-test SPECTREM airborne targets in the Flin Flon-Snow Lake Belt and beneath the Paleozoic in the Hargrave Lake-Moose Lake area.

Bell Resources conducted drilling at its Cleaver Lake property east of Flin Flon and tested a recently discovered high-grade copper showing. On an adjacent property, Interactive Enterprises drill-tested geophysical conductors. Aur Resources completed drilling at its Big Island Lake property just east of Flin Flon.

Inco Exploration conducted geophysical surveys and completed drilling in the Setting Lake area and on other high-priority targets in the Thompson Nickel Belt. In Thompson, Inco continued to explore the lower portion of the 1D Phase 2 orebody. The company, its employees and the union are working together to reduce operating costs at the mine to make the 1D project more attractive for capital investment.

Nuinsco Resources and partner Inco completed additional geophysical surveys and drilling on the Mel property northwest of Thompson. The drill program was designed to test geophysical targets located within favourable Thompson-type stratigraphy. Massive to disseminated sulphides were intersected within the favourable host rocks, but no significant assays were reported.

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[12] The Manitoba review of activities was prepared by the Mineral Resources Division of Manitoba Industry, Economic Development and Mines. For more information, the reader is invited to contact Ric Syme, Director, Manitoba Geological Survey, by telephone at (204) 945-6556 or by e-mail at rsyme@gov.mb.ca.

Falconbridge and partner Donner Minerals completed geophysics and drilling at their Stephens Lake property near Gillam. The area is extensively covered by overburden and is suspected to contain an extension of the Thompson Nickel Belt. Drilling by a previous property holder intersected ultramafic rocks while exploring for diamonds in the area. Drilling by Falconbridge intersected a thick interval of sulphide iron formation. Both rock units are key ingredients for the formation of Thompson-type nickel deposits. Further work was dependent on detailed analysis of drillcore and additional geophysics.

Anglo American Exploration (Canada) acquired a substantial land position in the Thompson area over the last couple of years. The company completed a winter program of geophysics and drilling on its Rock Lake permit north of Thompson. A summer mapping program was conducted on its permit southeast of Thompson in the Wintering Lake area.

In early September, Rare Earth Metals Corp. announced a new nickel-copper discovery 60 km northeast of Leaf Rapids. The discovery straddles a provincial highway and initial grab samples from the mineralized zone returned up to 2.47% nickel and 2.72% copper, as well as cobalt, gold and platinum group elements (PGE) values. Rare Earth has an option to earn a 100% interest in the property.

PLATINUM GROUP METALS

Gossan Resources completed a 12-hole drill program on its Bird River sill property near Lac du Bonnet. Drilling intersected narrow sulphidic intervals containing 1 to 2.5 g combined PGE and gold. The company recently acquired the adjacent Page property. Mapping at the Page property, conducted by the Manitoba Geological Survey in 2001, identified disrupted chromitite layers that have a correlation with PGE-bearing sulphides of the Bird River sill.

GOLD

Gold exploration expenditures in 2002 more than doubled to almost $7.6 million from $3.3 million in 2001. It is expected that this upward trend in spending will continue for 2003 and into 2004 as the bullish sentiment for gold persists.

Bema Gold's Monument Bay project in northeastern Manitoba returned some very encouraging results in 2003. The company conducted an extensive winter drill campaign that focussed largely on the recently discovered Twin Lakes West zone and included intercepts of 7.9 m of 10.77 g/t gold and 1.0 m of 180.7 g/t gold. Drilling on this zone extended the known mineralized horizons from 170 m to 400 m along strike. The winter drill campaign increased the inferred resource by 30% from previous working estimates to 639 377 t averaging 20.4 g/t gold representing 418 000 oz of contained gold. Bema also conducted a summer mapping and geochemical sampling program, and additional drilling was under way in August. Bema has now earned a 70% interest in the Monument Bay property from Wolfden Resources.

International Curator Resources and partner Rare Earth Metals Corp. completed 3750 m of drilling at their Assean Lake gold property. Curator, the operator, reported the discovery of a new gold occurrence at Blowfish Lake that returned 6.2 m of 5.69 g/t gold. Drilling also further tested the BIF zone and selected geophysical and geochemical anomalies over a wide area of the property. Reconnaissance drilling intersected significant gold mineralization in five holes, including the Blowfish occurrence. There are now a total of eight gold showings at Assean Lake over the extensively clay-covered 12-km strike length of the Assean Lake shear zone.

In the Flin Flon-Snow Lake Belt, Foran Mining conducted bulk sampling and drilling programs at its North Star property located 35 km west of Snow Lake. Quartz veins at the North Star property contain coarse gold and exhibit the typical nugget effect. Metallurgical results from blast-hole samples taken during the bulk sampling returned head grades ranging from 7.5 to 16.5 g/t gold. Some of the better drill intersections from the 48-hole program included 33.5 g/t gold over 2.19 m and 24.0 g/t gold over 2.50 m. Environmental studies were being carried out and Foran was seeking additional financing to proceed with underground development.

Other companies conducting drill programs in the Flin Flon-Snow Lake Belt included First Majestic Resources at its Wekusko property and Claude Resources at its Tartan Lake mine property near Flin Flon. First Majestic completed 14 holes at Wekusko, extending the strike length of the existing Gold Dust zone. Coniagas Resources completed linecutting at its Squall Lake option property near Snow Lake. The property contains a number of known gold zones and has a long history of exploration work.

In the Lynn Lake area, Trans America Industries conducted an extensive trenching and mapping program at its Arbour Lake property. The trenching work revealed highly silicified and intensely deformed carbonate-enriched bedrock. A winter drill program is being planned.

In northeastern Manitoba, Tanqueray Resources and Gossan Resources conducted mapping and sampling programs on their respective permit properties in the Sharpe Lake area, just west of Bema Gold's Monument Bay property. Gossan intends to explore the PGE potential of a 6-km-long layered sequence of gabbro and pyroxenite on its property.

In the Bissett area of southeastern Manitoba, Placer Dome conducted a mapping and sampling program on the Central Manitoba property, which is under option from Mid-North Resources. The property contains two former producing gold mines, the Central Manitoba and Ogama-Rockland mines, as well as the Cryderman occurrence, which has received substantial exploration activity. Other companies conducting mapping and sampling programs in the Bissett area included Gossan Resources at the Angelina property and Wildcat Exploration at its Poundmaker and Siderock Lake properties.

DIAMONDS

A significant mineral disposition acquired near Red Deer Lake indicated renewed interest in west-central Manitoba as a potential source for diamonds. Manitoba Geological Survey investigations have reported airborne magnetic anomalies in this region similar to those found just across the border in Saskatchewan where kimberlites have been discovered. The search for diamonds also continues in the northern Superior Province and Hudson Bay Lowland. Land acquisitions for diamond exploration totalled 951 600 ha as of September 2003.

SPECIALTY/INDUSTRIAL MINERALS

Tantalum Mining Corporation continued exploration for tantalum- and cesium-bearing pegmatites in the Bernic Lake area in southeastern Manitoba.

A preliminary surface exploration program carried out by Rare Earth Metals Corp. at its Eden Lake project, located 35 km northwest of Leaf Rapids, led to the discovery of a large carbonatite complex. The complex is particularly significant due to its rare earth element (REE) enrichments over an extensive area. Several mineralization types with economic potential were identified, including high-grade veins, carbonatite dikes, fenitic selvages of the carbonatite dikes, and altered syenite and other host rocks. The highest REE concentrations encountered were in the dikes (up to 1.6% total REE, 9764 ppm strontium and 745 ppm yttrium) and in hydrothermal REE-rich veins (up to 13.8% total REE, 5307 ppm yttrium and 5465 ppm thorium plus uranium).

Berger Group Ltd. continued to develop a sphagnum peat bog, 20 km south of Hadashville in southeastern Manitoba. Sunterra Horticulture (Canada) Inc. leased a bog 10 km south of The Narrows on the west shore of Lake Winnipeg. The bog was prepared for production and shipping facilities were almost completed.

Gossan Resources drilled five holes at Sandridge, increasing reserves of magnesium ore to 100 Mt. A 75-kg bulk sample was flown to Mintek Engineering in South Africa for metallurgical characterization to verify potential suitability for the production of magnesium using the thermal process.

In 2002, Albchem Manitoba Ltd. completed construction of a 40 000-t/y sodium chlorate plant at Hargrave (10 km west of Virden). Raw material for the plant is salt dissolved from the Devonian Prairie Evaporite at depth. The site was selected because of its proximity to the salt deposit and favourable hydro rates. ERCO Worldwide, a division of Superior Plus Inc., purchased the plant in 2003.

Graymont Western Canada Inc. continued to quarry high-calcium limestone and high-purity dolomite in Manitoba's Interlake. The limestone is situated within the Devonian Elm Point formation near Faulkner. It is calcined into high-calcium lime in a plant adjacent to the quarry. The dolomite is located at Hilbre and is trucked to the plant where it is calcined into dolime.

Bird River Mines Co. Ltd. continued the development of a deposit of high-purity, non-swelling calcium bentonite near Deerwood, 8 km northwest of Miami, Manitoba.

At Brandon, Nexen Inc. completed a $50 million, 70 000-t/y expansion of its sodium chlorate facility. Salt for the process is purchased from Saskatchewan potash producers.

Manitoba Geological Survey Activities

The Manitoba Geological Survey strives for a balanced approach to geoscience programming within Manitoba. In addition to a new direction proposed for the multimedia geochemistry program, the survey continued to maintain strong support for existing mining communities.

Multi-disciplinary, multi-agency geoscience studies in the Gillam-Split Lake-Thompson-Wabowden areas began in 2003 and will extend over three years. Coordinated investigations, including bedrock mapping, airborne geophysical surveys, and geochronological and geochemical studies, are aimed at stimulating exploration for nickel, gold and diamonds in an area that is home to more than 27 000 Manitobans. Partners in this three-year project include Manitoba Geological Survey, Manitoba Hydro, the University of Alberta, Waterloo University, the University of Manitoba, and the Geological Survey of Canada (through a Targeted Geoscience Initiative project).

Field projects in support of gold exploration were conducted in the Bissett, Lynn Lake and Snow Lake areas (all historic gold mining regions), as well as in east-central Manitoba (a location of current exploration interest). The escalating price of gold sparked considerable interest in this metal and a number of companies acquired ground positions to explore in Manitoba.

Projects aimed at supporting base-metal and platinum-group-metal exploration were conducted in the Flin Flon, Snow Lake, Leaf Rapids and Lynn Lake areas, as well as in southeastern Manitoba. These studies range from detailed mapping of mine stratigraphy at Flin Flon to the use of whole-rock geochemistry as a tool to locate massive sulphide mineralization.

Follow-up work to the previous year's successful reconnaissance for iron oxide-copper-gold (IOCG) deposits in Manitoba added to the discovery of a rare-earth-element-enriched carbonatite complex at Eden Lake.

Although results from kimberlite indicator mineral (KIM) surveys in the past 20 years have been promising, no discoveries of diamondiferous kimberlite were announced in Manitoba. Diamondiferous kimberlites have been discovered in the adjacent provinces of Saskatchewan and Ontario, as well as in the Northwest Territories and Nunavut, and there is no fundamental geological reason to expect that kimberlites should not be present in Manitoba. In order to provide geoscience support to the diamond exploration effort in Manitoba, the Manitoba Geological Survey has compiled all geological data pertinent to kimberlites in Manitoba, including: 1) compilation of a KIM database, which includes all published indicator mineral data from regional and detailed sampling programs; 2) resubmission of archived till samples for KIM and geochemical analysis; 3) a petrographic, geochemical and geochronological investigation of drillcore from the Wekusko Lake area containing an intersection of possible kimberlite; 4) compilation of various provincial datasets in order to delineate anomalies with kimberlite potential; and 5) assessment of till stratigraphy in the Hudson Bay Lowland. The information will be available to explorationists through the Department's Internet Map Server.

Over the past several years, drill-hole and surficial mapping databases were reformatted by the Manitoba Geological Survey to be used in a geographic information system (GIS) environment to provide input into livestock management issues relating to groundwater. This work was conducted in collaboration with the Geological Survey of Canada and involved the construction of a three-dimensional geological model for the subsurface geology in agro-Manitoba. The mapping utilizes computer technology and is designed to also support activities related to hydrocarbon and industrial mineral development.

In June 2003, a community-based pilot Prospector Training Program was held for participants from the Sagkeeng First Nation. The intensive four-week program was developed in collaboration with Sagkeeng and delivered by Mineral Resources Division staff and other provincial government and industry experts. Ten students graduated from the course with a Manitoba Prospectors Licence and Blasting Certificate. The pilot project reflects the goals and objectives of the Manitoba Minerals Guideline developed in 1998 by First Nations, Metis Nations, the Northern Association of Community Councils, the Manitoba minerals industry and the Province of Manitoba. The goal is to foster relationships and economic development opportunities among those involved in or affected by mineral activities in Manitoba.

Outreach activities developed to increase public awareness of Manitoba's mineral resources and exploration and mining industry were offered again in 2003 as part of Provincial Mining Week celebrations and also at the annual Manitoba Mining and Minerals Convention. The free activities drew more than 2000 visitors from the general public and the school tours program.

Incentives

The Government of Manitoba has made more than $7.8 million in funding available over a three-year period starting in April 2002 to further encourage exploration and mining investment in the province. The funding is obtainable through the following programs:

MINERAL EXPLORATION ASSISTANCE PROGRAM (MEAP)

The Mineral Exploration Assistance Program (MEAP) provides financial assistance of up to 25% of eligible exploration expenditures to a maximum of $300 000 per recipient per fiscal year to companies or individuals undertaking mineral exploration in Manitoba. The program, established in the fall of 1995, aims to increase mineral exploration and stimulate activities that may lead to the development of new mines and industrial mineral deposits. Companies or individuals may qualify for up to 35% of eligible exploration expenditures to a maximum of $400 000 per recipient per fiscal year in specified areas of the province. MEAP conducts two offerings per fiscal year to coincide with the spring/summer and fall/winter exploration seasons.

MEAP announced its first offering of $1 million in October 1995, followed by $3 million per fiscal year, for three years, beginning January 2, 1996, and ending March 31, 1999. A continuation of the program was approved in June 1998 with $8.25 million of assistance allocated over a three-year period beginning April 1, 1999. In April 2002, Manitoba reconfirmed its commitment to mineral exploration in the province by renewing MEAP for an additional three years. The program will offer

$7.5 million in funding over the three-year period. To further stimulate exploration in areas affected by mine closures, MEAP was expanded to provide a higher percentage of assistance on eligible expenditures for projects in the Lynn Lake/Leaf Rapids area and Bissett region.

Program Highlights from October 1995 to March 31, 2003

- From October 1995 to March 31, 2003, a total of 108 companies have participated in MEAP, representing 348 exploration projects.
- Of these 108 companies, 72 are considered new to Manitoba, including 7 joint-venture partners. Of the 108 companies, 17 are major exploration companies and 91 are junior companies (a company is considered a major exploration company if its market capitalization is greater than $100 million).
- A total of $15.7 million in assistance has been issued to 348 completed projects.
- A total of $71.2 million in exploration expenses has been reported.
- Reported exploration expenditures under the program indicate that every $1 million in assistance paid generated $4.5 million in exploration expenditures.

Several companies with MEAP-assisted exploration projects had exciting results to announce in 2003. International Curator Resources reported a new gold discovery at Assean Lake and Bema Gold Corporation continued to explore and add to its significant gold resource in northeastern Manitoba. Rare Earth Metals Corporation, another MEAP recipient, discovered heavy rare earths at Eden Lake. The rare earths were identified as part of a large carbonatite complex – the first such complex to be discovered in Manitoba.

MANITOBA PROSPECTORS ASSISTANCE PROGRAM (MPAP)

The Manitoba Prospectors Assistance Program (MPAP) was introduced in 1992 at an annual funding level of $100 000 per year to provide financial support to self-employed prospectors. Qualified applicants received up to 50% of expenditures incurred to a maximum assistance level of $7500 per applicant per year upon completion of the field project and submission of an acceptable report. In an attempt to increase the level of mineral prospecting in Manitoba, the MPAP funding level was increased to $150 000 per year for each of fiscal years 1996 through 1998. Upon evaluation of the program, annual funding for MPAP was decreased to its current level of $125 000 per year in 1999. In 2001, the Prospectors Assistance Program Regulation was amended to increase the assistance available for projects undertaken in more remote areas of the province. For these projects, the regulation provides up to an additional $1500 per year for the cost of chartered fixed-wing aircraft. In April 2002, the Manitoba government renewed MPAP for another three years at its previous funding level of $125 000 per year.

Since the inception of this program, 242 projects have been completed with approved expenditures totalling $2 175 388. A total of $1 087 693 has been paid out.

The summer 2003 program received 22 applications for estimated project expenditures of $284 166. Twenty-two projects were approved.

MANITOBA MINERAL EXPLORATION TAX CREDIT (MMETC)

The MMETC was introduced by the Government of Manitoba in April 2002 to promote investment in Manitoba-based exploration projects. The MMETC is a 10% non-refundable personal income tax credit for investors in eligible flow-through shares of qualifying mineral exploration companies and can only be applied against Manitoba tax payable. The MMETC parallels and tops up the 15% federal exploration tax credit. Eligible investments and qualifying exploration activity are tied to federal eligibility, except that substantially all of the exploration activity must be undertaken in Manitoba.

A reported $960 000 has been raised via flow-through share financing from October to December 2002 for mineral exploration in the province. Of that, approximately $175 000 will be eligible for the MMETC. From January 1 to October 1, 2003, $6.1 million has been identified as financing raised via flow-through shares for mineral exploration in Manitoba. Approximately $350 000 could be eligible for the MMETC. Investments qualifying for the MMETC may fulfill one of the objectives of the tax credit, which is to help support local companies and junior exploration companies operating in the province. (Note: All flow-through share statistics reported above were compiled from company press releases.)

ASSAY CREDIT PROGRAM

For the 2002/2003 fiscal year, the province allocated $20 000 towards this program. A prospector can earn assay credit coupons for eligible expenditures on exploration work. Coupons can be redeemed for assays of gold, silver, copper, lead, nickel, zinc, molybdenum, chromium, titanium or tin as specified in Manitoba Regulation 64/92. Coupons can also be redeemed for geochemical analysis of other metals not covered in the regulation by obtaining permission from the Assessment Geologist of the Mines Branch.

In fiscal year 2002/2003, a total of 4100 credits were issued to 15 prospectors; 4 prospectors redeemed 1862 credits.

Land Use

Progress towards meeting provincial obligations for Treaty Land Entitlement, Northern Flood and Grand Rapids Forebay agreements was made. Seventy-eight land selections representing approximately 123 007 ha were assessed and approved. Land selections containing valid mineral dispositions in good standing were documented. New procedures for land selections for the Grand Rapids Forebay Agreement are being developed.

Implementation of the Network of Protected Areas Action Plan and the identification and assessment of candidate sites continued with special attention given to Wildlife Management Areas, northern areas of special interest, and Crown land in Agro-Manitoba.

Policy development and implementation for the provincial sustainable development initiative focussed on areas such as the Code of Practice, Financial Management Guidelines, sustainability indicators and reporting, mineral strategy, and the East Side of Lake Winnipeg and Shoal Lake Watershed management plan. Principles and practices of sustainable development were incorporated into several land management plans.

More information on exploration and mining in Manitoba is available on the Manitoba Industry, Economic Development and Mines, Mineral Resources Division, web site at www.gov.mb.ca/itm/mrd.

2.8 SASKATCHEWAN[13]

Overview

Mineral exploration, development and production were again robust in Saskatchewan in 2003. Total annual expenditures are estimated to be $35.7 million,[14] up about 29% from the actual total annual expenditures in 2002 of $27.78 million (**Figure 23**). Diamonds, uranium and gold were the primary focus. A new kimberlite was discovered in the now well-established Fort-à-la-Corne district, and the advancement of capital-intensive diamond evaluation projects reflects a positive long-term view for the exploration potential of the district. The Athabasca Basin continues to be the world's premier exploration district for high-grade uranium deposits. Global uranium industry leaders Cameco Corporation and COGEMA Resources Inc. are the most active, but more than a dozen companies are exploring. Gold exploration expenditures are forecast to exceed $3 million, up about 25% compared to last year and four times higher than in 2000. Work is being done by junior exploration companies and "small-cap" mining companies.

The mines of the Athabasca Basin in northern Saskatchewan and those of the Prairie Evaporite in central Saskatchewan continued to be the world's most important supply of uranium and potash, respectively. In 2002, Saskatchewan produced 100% of Canada's uranium and accounted for 34% of world output, and produced 95% of Canada's potash and accounted for about 33% of world production and 43% of world trade. Other metallic mineral production in 2003 included copper, zinc, gold and silver. Other industrial mineral production included sodium sulfate, aggregate, bentonite, peat and silica sand.

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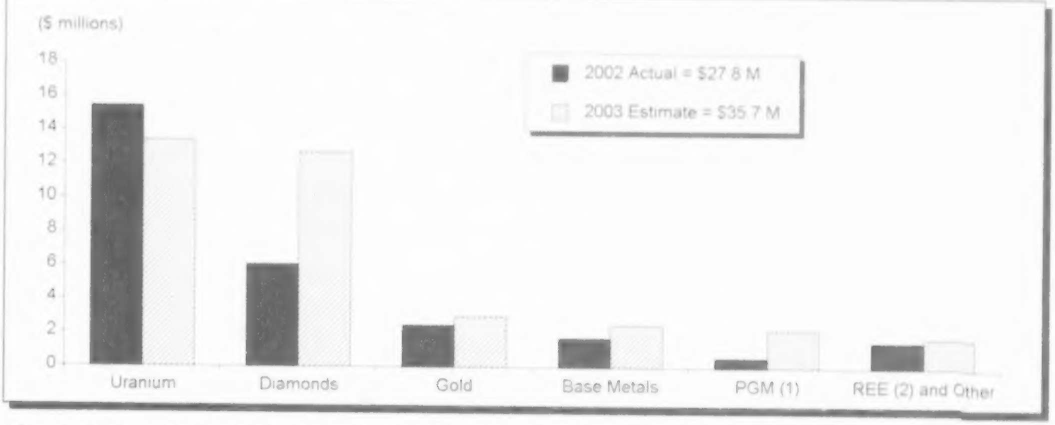
[13] The Saskatchewan review of activities was prepared by M.H. Gunning and Steve Rymes of Saskatchewan Industry and Resources. For more information, contact Gary Delaney, Director, Saskatchewan Geological Survey, by telephone at (306) 787-1160 or by e-mail at gdelaney@ir.gov.sk.ca.

[14] These expenditures are from the annual survey of mineral exploration expenditures undertaken by the Saskatchewan Department of Industry and Resources.

Figure 23
Mineral Exploration Expenditures in Saskatchewan, 2002 and 2003



Source: Data compiled from the annual survey of exploration expenditures by the Saskatchewan Geological Survey.
(1) Platinum group elements. (2) Rare earth elements and tantalum.

Information Sources

This paper is a synthesis of current activity only. More detailed results from current exploration and extensive tabulated data on current reserves and resources are available in the annual publication *Saskatchewan Exploration and Development Highlights*. A more comprehensive summary of the economic geology of the province, including historical reserve and production data, is in *Geology, and Mineral and Petroleum Resources of Saskatchewan.*[15] Web sources for up-to-date information on all Saskatchewan mineral occurrences include the *Saskatchewan Geological Atlas*[16] and the *Saskatchewan Mineral Deposits Index,*[17] both available at the Saskatchewan Industry and Resources web site (www.ir.gov.sk.ca).

A variety of grade, tonnage, reserve and resource data are reported herein. Current exploration expenditure forecasts are compiled from the annual survey of exploration expenditures conducted by the Saskatchewan Geological Survey. Actual annual expenditures for previous years are from the same survey and are published annually in *Saskatchewan Exploration and Development Highlights*. Grade, tonnage, reserve and resource numbers reported herein are from a variety of public sources, including published reports, public records, corporate web sites and Saskatchewan Mining Association *Facts Sheets*. They do not necessarily conform to current Canadian Institute of Mining, Metallurgy and Petroleum standards and National Instrument 43-101 of the Canadian Securities Commission.

Exploration

Uranium

There are more than a dozen companies actively exploring the Athabasca Basin for uranium, mainly in the eastern part where most of the major deposits are located. Many of the programs are joint ventures with Cameco Corporation and/or COGEMA Resources Inc. Programs span reconnaissance work utilizing sophisticated geophysical methods to target deeply buried deposits, regional target testing, and follow-up target delineation by diamond drilling, as well as aggressive mine area exploration.

Cameco is the most active explorer of the Basin, undertaking both mine area and reconnaissance work. At the Eagle Point mine, both surface and underground exploration programs that started in 2002 continued in 2003. Regional programs, mostly on behalf of joint ventures for whom Cameco is the operator, included the continuation of target testing at the La Rocque Lake discovery north-northwest of the Midwest deposit and additional delineation drilling on the Millennium zone, a new discovery announced at the end of 2002. The latter is southwest of McArthur River. The best published intersection of 4.28% U_3O_8 over 30.3 m is considered to be of ore grade and thickness.

COGEMA also did both greenfield and mine area exploration in 2003. Reconnaissance target testing continued along the southern margin of the Basin in the Mirror River area. Favourable intersections made in 2002 at Caribou Lake, 2 km northwest of the SUE C open pit on the McClean Lake property, were followed up in 2003.

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[15] Saskatchewan Geological Survey (2003): *Geology, and Mineral and Petroleum Resources of Saskatchewan*; Saskatchewan Industry and Resources, Miscellaneous Report 2003-7, 173 pp.

[16] Slimmon, W.L. (2002): *Geological Atlas of Saskatchewan*, version 5 (2002); Saskatchewan Industry and Resources, CD-ROM, version 5.

[17] Bennett, R.W. (2002): *Saskatchewan Mineral Deposits Index*; Saskatchewan Industry and Resources, Miscellaneous Report 2002-6, CD-ROM, version 1.0.0.

Efforts continued in 2003 to advance the Moore Lake prospect in the southwestern part of the Basin. Owner JNR Resources announced a new partnership with the International Uranium Corp. of Denver, Colorado, and permitting is complete for a 2003/2004 winter drill program. The best published results from the 2001/2002 winter drill campaign were from DDH ML-25, which returned 0.53% uranium (0.62% U_3O_8) over 9.1 m including a 4.8-m interval of 1.02% uranium (1.2% U_3O_8) and including a 0.4-m interval of 10.18% uranium (12% U_3O_8).

UEX Corporation went public in 2002 to aggressively pursue targets on the consolidated property assets of Pioneer Metals, Cameco and DF Exploration Uranium Ltd. in the Riou Lake, Black Lake and Hidden Bay areas. The best published intersection from drilling in the 2002 winter season was 9 m of 1.43% uranium (1.686% U_3O_8) from the West Bear target on the Hidden Bay property southwest of the historic Rabbit Lake deposit. Twenty diamond drill holes were completed in the 2003 winter season on five different targets on the property. Extensive mobile metal ion soil sampling initiated in 2002 was continued in the summer of 2003 at Hidden Bay, and three diamond drill holes were completed on the Kewen target. An extensive, $900 000 drill program is planned for the 2003/2004 winter drill season to advance established targets on both the Hidden Bay and Riou Lake properties.

Overall, the current high levels of uranium exploration expenditures are buoyed by improving metal value as the spot price for uranium continued to rebound from the all-time low of US$7.10/lb U_3O_8 at the end of 2000. The restricted spot price was US$9.30/lb U_3O_8 on October 1, 2001, and it rose to US$9.75/lb U_3O_8 by October 1, 2002. The price rise continued through 2003. The average spot price for the second quarter was US$10.89/lb U_3O_8 while the spot price on October 1, 2003, was US$12.20/lb U_3O_8.

Diamonds: Fort-à-la-Corne District

Diamond exploration in the Fort-à-la-Corne district, 60 km east-northeast of Prince Albert in central Saskatchewan, was again robust in 2003. On October 1, 2003, more than 50 companies and individuals held a total of 648 000 ha. Total expenditures are forecast at $12.7 million, up significantly from the actual total expenditure in 2002 of $6.0 million (**Figure 23**). The Fort-à- la-Corne Joint Venture completed a major diamond drill program targeting numerous kimberlites as follow-up to newly announced results for 2000/2001 and 2002 bulk sample programs. Shore Gold began shaft sinking for its underground bulk sampling program on the Star kimberlite, and the first kimberlite discovery in the district since 1996 was made on the East Side diamond property by Forest Gate Resources. Overall, the advancement of capital-intensive diamond evaluation projects reflects a positive long-term view for the exploration potential of the district.

STAR KIMBERLITE PROJECT

Shaft sinking on the Star kimberlite owned by Shore Gold Inc. began in 2003 in order to obtain a 25 000-t bulk sample. The estimated budget for the program is between $6 million and $7.5 million, depending upon the amount of kimberlite processed.

The Star kimberlite is at the southeast end of the Fort-à-la-Corne kimberlite field. It consists of diatreme and pyroclastic crater facies rocks covering an area of 4 km^2 and ranging from 3 m to more than 540 m thick. Preliminary estimates of continuous diamond-bearing kimberlite are approximately 500 Mt with an average thickness of 88 m based on a minimum cutoff thickness of 30 m.

In December 2002, Shore Gold received the necessary approvals to initiate its bulk sampling program. The program was designed to recover a parcel of at least 3000 ct of diamonds to enable an accurate valuation of stones. It involves the sinking of a 4.5-m-diameter vertical shaft and drifting to recover up to 25 000 t of kimberlite. At 89 m, the shaft reached the transition from glacial till to Cretaceous sediments. The sediment-kimberlite transition was reached at 107 m. On December 5, 2003, the shaft reached 173 m and the first of three planned lateral drifts was started. All kimberlite material is being stockpiled in a fenced, secure location. A modular diamond recovery plant has been assembled and is being commissioned. The plant components include a Dense Media Separator (DMS), x-ray sorter and a grease table to produce a diamond-rich concentrate that will be sorted in a secure facility.

FORT-À-LA-CORNE JOINT VENTURE

In 2003, the Fort-à-la-Corne Joint Venture (De Beers Canada Exploration Inc., operator [42.25%], Kensington Resources Ltd. [42.25%], Cameco Corporation [5.5%], and UEM Inc. [carried 10%]) reported results from both 2000/2001 and 2002 drill programs and completed a major diamond drill core program.

The Fort-à-la-Corne Joint Venture has a property holding containing 63 kimberlite bodies that constitute one of the volumetrically largest kimberlite fields in the world. The bodies range from 2.7 to 250 ha in size based on geophysical modeling. The kimberlite bodies are commonly composite in nature and made up of multiple pyroclastic crater-facies deposits. Recent exploration activity has focused on the 140/141 body, but the 122, 148 and 150 bodies are also high-priority targets.

Grades for the 11 large-diameter boreholes (610 mm; 24-inch) drilled in 2000 and 2001 range up to 41.5 carats per 100 tonnes (ct/ht) and cumulatively average 5.5 ct/ht. Actual average parcel diamond values for the 2001 stones were posted at US$52.60/ct, reflecting a substantial increase from US$33.67/ct for the 2000 stones. The single largest stone measures 3.335 ct. It was recovered from large-diameter drill hole 141-20 and is valued between US$390/ct and US$450/ct. Modeled macrodiamond values, which take into account the expected diamond size distribution from any potential future production scenario, ranged from US$20/ct to US$220/ct. De Beers reported a preliminary range of revenue values from US$1/t to US$26/t, based on modeled values and grade estimates for the modeled size distributions. Confidence limits of 80% for the modeled values and the preliminary assessment of revenue reflects variability in diamond size distribution and diamond value, not grade.

Based on the results from 2000 and 2001, a $5.2 million program was carried out in 2002 on the 140/141 kimberlite body. The program consisted of 25 core holes and 8 large-diameter (three 91-cm and five 61-cm) reverse circulation boreholes. The final results of the 2002 program were released in October of 2003. This included the verification of a significantly higher-grade zone known as the kimberlite breccia unit. This unit had the best diamond recovery and has an estimated grade forecast of 15 ct/ht. Results also included updated modeled grades and revenues for distinct units in the 140/141 kimberlite body. Grade forecasts varied from 5 ct/ht to 15 ct/ht while revenue estimates varied from US$67/ct to US$97/ct. One prominent highlight was the recovery of a 10.2-ct diamond. Further work is required to increase confidence levels in grade and revenue forecasts for the 140/141 kimberlite because it has since been divided into numerous geological units.

In the final quarter of 2003, a two-phase exploration program was initiated. Phase I cost approximately $3 million and was completed in November. A total of 49 diamond drill holes tested priority kimberlites 140/141, 150, 148 and 122. The Phase I program also included an airborne magnetic gradiometric survey over the entire property. Phase II, scheduled for the spring and summer of 2004, will include the drilling of large-diameter drill holes into targets based on the Phase I core hole drilling.

CANDLE LAKE PROJECT

In September 2003, Great Western Minerals Group announced the formation of a wholly owned subsidiary named Great Western Diamonds Corp. (GWD) to take over all diamond-related activities. All of the company's diamond properties will be transferred to the subsidiary, which will be publicly traded in 2004.

The 22 663-ha Candle Lake joint-venture property (Great Western Diamond Corp., operator, 80%, and War Eagle Mining Co Inc., 20%) is north of the main Fort-à-la-Corne kimberlite trend. It covers two large diamondiferous kimberlites, the southerly C28 kimberlite and the C29/30 kimberlite 30 km to the north. The kimberlites have a combined estimated mass of 78 Mt. Previous NQ drilling resulted in the recovery of 75 macrodiamonds (one dimension >0.5 mm) and 464 microdiamonds from 3.84 t of core samples. Although grade estimates are highly variable, projected grades as high as 27 ct/ht have been reported in CL95-01 and 21 ct/ht in CL95-06 from the C29/30 kimberlite. Some of the best results to date are from WSL-10, an HQ drill hole in the C29/30 kimberlite that intersected 107 m of kimberlite and returned 126 diamonds, including 5 macrodiamonds (one dimension >0.5 mm) from 170 kg of material. Overall grade estimates for C29/30 average 11 ct/ht. Macrodiamond frequency and projected grades are comparable to results reported from the same exploration stage on other kimberlite bodies in the district.

EAST SIDE DIAMOND PROPERTY

At the East Side diamond property (Forest Gate Resources Inc. [85%] and Leader Mining International Inc. [15%]), examination and reprocessing of old aeromagnetic data was followed by a ground magnetic survey in April 2003, which delineated a 250-m-wide anomaly 2.5 km east of the FALC 121 kimberlite. The property is adjacent to the east side of the FALC property and to the north side of Shore Gold's property. NQ drilling in June intersected 23 m of kimberlite (Dizzy kimberlite) before the hole was lost in kimberlite. This is the first new kimberlite discovery in the district since 1996. A second hole was attempted but was lost in overburden at 72 m. A very small sample set (three sets at 8 kg each) was processed for diamond recovery, but no diamonds were found. A gravity survey was carried out in August to estimate the size and shape of the Dizzy kimberlite and to identify new targets. The kimberlite is interpreted to be up to 100 m thick with a footprint of about 5 ha. Further re-processing of detailed aeromagnetic data identified a second anomaly measuring 600 m in the north-south direction and 400 m in the east-west direction (footprint area of about 19 ha) on the southern border of the property. The anomaly is a weak magnetic high that was tested by ground magnetics and gravity in August 2003. An aeromagnetic survey was flown over the entire East Side property in order to identify any other possible targets. The joint venture plans to drill five holes in the Dizzy kimberlite and possibly one hole in the new target to the south.

OTHER DIAMOND PROJECTS

United Carina Resources Corp., Consolidated Pine Channel Gold Corp., and Shane Resources have entered into an agreement with Casavant Mining Kimberlite International (CMKI) whereby the three companies have the right to acquire an undivided 10% interest each in 82 prospective claims held by CMKI. In addition, CMKI has the first right of refusal to acquire up to a 49% interest in any diamond exploration property held by the former companies.

Gold

Exploration expenditures for gold are expected to reach $3 million in 2003, nearly four times the level of just three years ago. The steady increase parallels the rise in the gold price from the month-end close of US$264.80/oz on October 31, 2000, to US$411.10/oz on November 15, 2003.

Golden Band Resources has consolidated a large land package in the La Ronge gold belt. The holding exceeds 50 000 ha. The Jolu mill complex, which has been kept on care and maintenance since the mid-1990s, is centrally located. Historic resources contained within numerous small, but high-grade, past producers exceed 800 000 oz of gold (Saskatchewan Geological Survey, 2003). Positive economic models for the camp are based on a centrally located mill facility to process ore extracted from numerous satellite deposits.

Late in 2002, a winter drill program was carried out on the Bingo target on the Dickens West property. Ten holes totalling 1805 m were completed. Results were released in 2003. Resources, using a cutoff grade of 5 g/t gold, are 50 300 t averaging 11.71 g/t gold (18 925 contained oz) in the indicated category and 114 000 t averaging 11.91 g/t gold (43 633 contained oz) in the inferred category.

The Memorial, Phantom and Fortuna targets, near Tower Lake in the greater Waddy Lake region, were drill tested in 2003. The Memorial gold deposit is 1.5 km northwest of Tower Lake and contains an indicated mineral resource of 476 000 t averaging 2.1 g/t gold (i.e., 38 480 oz of gold at a cutoff grade of 1 g/t gold). A total of 28 holes (1968 m) were completed. Very high-grade intersections include 1 m at 290 g/t gold (8.5 oz/ton) in DDH MM-19; 1 m at 217 g/t gold (6.3 oz/ton) in DDH MM-21; 1 m at 491.8 g/t gold (14.3 oz/ton) and 2 m at 267 g/t gold (7.8 oz/ton) in DDH MM-35; and 0.9 m at 171.5 g/t gold (5.0 oz/ton) in DDH MM-36. The Phantom and Fortuna exploration targets are inferred to be the westerly extension of the Tower East deposit. They form a 2-km-long zone that is probably related to the Byers fault. Nine holes totalling 1033.5 m were completed on these two targets. The more significant intersections at the Phantom target are 1 m grading 6.93 g/t gold (0.19 oz/ton), 3.6 m grading 1.38 g/t gold (0.04 oz/ton), 1 m grading 3.30 g/t gold (0.10 oz/ton), and 1.2 m grading 3.23 g/t gold (0.09 oz/ton). The more significant intersections at the Fortuna target are 1 m at 3.2 g/t gold (0.09 oz/ton) and 3 m at 2.35 g/t gold (0.07 oz/ton).

Golden Band also carried out an extensive regional till sampling program between June and September 2003, including on-site sample processing and separation of gold grains. Approximately 1400 till samples were collected within a 30-km-long by 10-km-wide corridor between the Jolu mill and Tower Lake. A total of 53 bulk samples approximately 45 kg in size were also collected to evaluate the economics of mining the Riddle Till, a gold-in-till dispersion train that originates from the EP deposit. An additional 400 till samples were also collected on the Dickens West property located between the Churchill River and Bervin Lake.

In January 2003, Masuparia Gold Corporation announced the results of its 2002 exploration program on the Greywacke Lake gold property, 85 km north-northeast of La Ronge in the east-central part of the La Ronge domain. Thirteen drill holes totalling 1000 m tested the gold-bearing zone. Two diamond drill holes tested the Greywacke North gold zone at a depth of 200 m. Hole 02-76 cut 10.5 g/t gold (0.306 oz/ton) over a width of 1.8 m, including 1.08 m at 16.1 g/t gold (0.468 oz/ton). Hole 02-68 cut 4.9 g/t gold (0.143 oz/ton) over a width of 1.58 m, including 8.2 g/t gold (0.239 oz/ton) over 0.79 m. Fifteen additional holes tested the zone at shallow depth. Ten of these holes intersected gold mineralization over true widths up to 16.5 m, with grades up to 18.92 g/t gold (0.552 oz/ton) over 4.10 m. The average grade of the 10 holes is 7.54 g/t gold (0.22 oz/ton) over a true width of 9.13 m.

There was also active mine area exploration in 2003 by Claude Resources around its Seabee mine. Extended surface and underground drill programs are ongoing. Following up on its 2002 West Porky discovery 2 km north of the Seabee mine, Claude completed 5775 m in 28 holes of in-fill drilling on the Main zone, which successfully confirmed continuity over 400 m of strike and 250 depth. An additional 13 holes totalling 2913 m were completed to test a structure located 1 km to the northwest. This led to the discovery of the high-grade West zone, which is hosted by feldspathic arenite. This new zone is currently delineated by shallow drill holes only, but its depth potential and relationship to the Main zone are high priorities for continued drill testing in 2004.

Base Metals

Mine area exploration by Hudson Bay Exploration and Development Company Limited (HBED) in 2003 included the completion of four diamond drill holes totalling 2543.5 m on the Myo Lake rhyolite. HBED was also active in the Matheson Lake area, completing nine drill holes totalling 1957 m to test SPECTREM targets and two drill holes totalling 1066 m to test the Fon zinc zone. HBED also completed two drill holes totalling 847 m around the Konuto Lake mine and two drill holes totalling 644 m on the Suggi Lake target in the southern extension of the Flin Flon block, under the cover of Lower Paleozoic sedimentary strata.

Leader Mining is arranging financing to re-evaluate and further explore the nearly 20-Mt Knife Lake copper-zinc deposit to the northwest of Flin Flon in the Glennie domain. Sediment-hosted copper showings around Janice Lake in the Wollaston domain were staked by Phelps Dodge Canada in 2002 and explored in 2003; work included prospecting, ground-based geophysics and geochemistry, and diamond drilling.

Other Commodities

Development of select rare-earth and rare-metal prospects in northernmost Saskatchewan continued in 2003. Great Western Minerals obtained additional material to continue metallurgical testing at its Hoidas Lake property. The Hoidas Lake-Nisikkatch Lake rare earth elements (REE) trend is located some 70 km northeast of Uranium City. A total of 26 separate showings are known along a 10-km trend that parallels, and is some 3 km west of, the regional-scale Black Bay fault. Rare earth elements are found in pyroxene-allanite-apatite zones in quartz-carbonate veins and as linings of densely spaced fractures within a shear zone system hosted by granulite facies quartzofeldspathic gneiss.

The JAK zone has a composite vein width of 3.2 m that is drill tested along 475 m of strike and to a depth of 65 m. Light rare earth elements that are predominant include cerium, lanthanum, neodymium and praseodymium with lesser samarium. Total rare earth oxide contents range between 4.2% and 5.28%. The zone is estimated to contain 1.03 Mt of ore. Metallurgical studies have determined that cold acid leach direct-extraction will achieve a 98.6% recovery rate for rare earth oxides. The additional sampling completed this year will lead to the design of a pilot plant to be constructed on or near the JAK zone in 2004. Great Western also plans to complete in-fill drilling in 2004 to improve resource calculations.

Production

Industrial Minerals

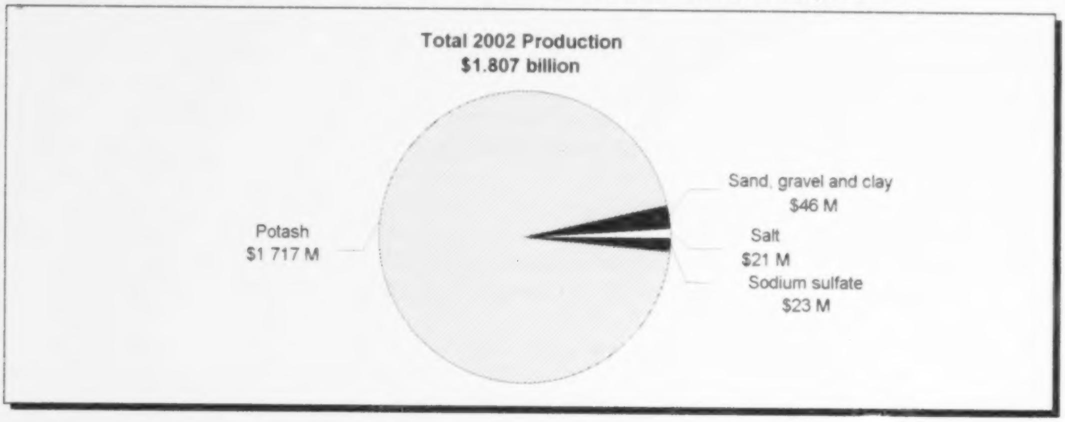
Industrial minerals are an important component of the non-renewable resource sector in Saskatchewan. They have consistently accounted for between 20% and 50% of the gross value of provincial mineral production during the past 30 years. Excluding coal, the four major products are potash, salt, sodium sulfate and aggregate, with minor production in structural clay, clinker, a naturally fired brick made from mudstone, bentonite and silica sand. Potash production in 2002 from 10 underground operations, including 2 solution mines, was 12.9 Mt valued at $1.7 billion. The total value of industrial mineral production for the year was just over $1.8 billion (**Figure 24**).

Uranium

There was production from three operations in the Athabasca Basin in 2003: Rabbit Lake, McClean Lake, and the McArthur River mine/Key Lake mill operation. Mining at McArthur River was temporarily suspended because of underground flooding. The Eagle Point mine at Rabbit Lake was the only other active mine. At McClean Lake, processing of stockpiled ore from the Jeb and Sue C deposit continued. Construction work continued at the Cigar Lake mine site with start-up targeted for 2006 providing all of the necessary permits are received. Global uranium industry leaders Cameco Corporation and COGEMA Resources Inc. operate all of the aforementioned mines and processing facilities and control about 57% and 35%, respectively, of identified reserves in the Basin. Overall, forecasts for total annual production for 2003 are down about 33% from 2002 due mainly to the temporary shut-down at McArthur River.

Total production of uranium in 2002 was approximately 12 684 t of uranium (32.98 million lb U_3O_8), virtually unchanged from the 2001 annual output of 12 586 t uranium (32.72 million lb U_3O_8). Production was from five operations, although at McClean Lake the Sue C pit was mined out early in the year and the Cluff Lake orebodies were mined out midway through the year.

Figure 24
Gross Value of Major Industrial Minerals Production in Saskatchewan, 2002



Source: Saskatchewan Industry and Resources, Mines Branch.

Milling of stockpiled ore continued at both McClean Lake and Cluff Lake, finishing at the latter site at the end of 2002. In addition to the McArthur River/Key Lake operation, production was restarted at the Eagle Point mine on the Rabbit Lake property.

McARTHUR RIVER MINE/KEY LAKE MILL

McArthur River is the largest high-grade uranium deposit in the world with proven and probable reserves of 175 652 t uranium (456.7 million lb U_3O_8) and an average grade of 19.51% uranium (23% U_3O_8). Grades within the orebody are up to 59.4% uranium (70% U_3O_8) locally, and composite grades of 25.4% uranium (30% U_3O_8) over several metres thickness are common. Uranium ore is structurally controlled by the P2N fault, which strikes N45E and dips 45 to 60^o southeast with an average offset of 70 m. Ore is hosted within Athabasca Group sandstone, the fault zone, and basement pelitic gneiss of the Wollaston Group.

McArthur River was shut down temporarily for three months in 2003 due to partial flooding. Prior to the shut-down, total production for 2003 at the Key Lake mill was forecast at 5000 t of uranium (13 million lb U_3O_8), but that forecast was downgraded by 27% on July 31, 2003, to 3615 t of uranium (9.4 million lb U_3O_8). In 2002, total annual production was just shy of 7500 t of uranium, with 7111 t of uranium (18.489 million lb U_3O_8) produced from McArthur River ore and an additional 193 t of uranium (0.502 million lb U_3O_8) produced from stockpiled Key Lake ore. Underground development at McArthur River is currently on the 530-m, 560-m, 580-m, 620-m and 640-m levels. Panels 1, 2, and 3 of Zone 2 are currently being mined behind a "freeze wall." Underground exploration drilling continues, focused along strike to the south where the deposit is open.

CIGAR LAKE

Cigar Lake is the world's second largest high-grade uranium deposit with total proven and probable reserves of 89 045 t of uranium (231.5 million lb U_3O_8) at an average grade of 16.17% uranium (19.07% U_3O_8). Total inferred resources are 45 465 t uranium (118.2 million lb U_3O_8) at an average grade of 14.35% uranium (16.92% U_3O_8).

Site preparation work continued at Cigar Lake in the summer of 2003. Building the collar for the No. 2 shaft was begun and the foundation for the headframe and hoist room was poured. Construction of the mine site began in July 2002 following successful Phase I licensing. Licensing approval for the second and final phase of construction is not expected until midway through 2004. Total construction time for the mine is estimated at 27 months. Underground mining is targeted to commence in 2006, pending completed regulatory approval and favourable market conditions. The total capital cost to put Cigar Lake into production is estimated at $350 million. An application was filed in 2002 to process all of the primary ore slurry from Cigar Lake at the McClean Lake concentrator (JEB mill) operated by COGEMA. If successful, the Rabbit Lake facility operated by Cameco would receive 57% of the pregnant solution from McClean Lake for further processing and production of yellow-cake, a proportion originally agreed to for the primary ore.

RABBIT LAKE

The Eagle Point mine will complete its first full year of production in 2003 following the reopening of the mine midway through 2002 by Cameco Corporation. The production forecast for 2003 is 2116 t of uranium (5.5 million lb U_3O_8).

The original Rabbit Lake deposit was discovered in 1968 and became the first high-grade uranium mine in the Basin in 1975. The Rabbit Lake facility is now the longest-running uranium mining-milling operation in Saskatchewan. At start-up in 2002, total reserves were approximately 6731 t of uranium (17.5 million lb U_3O_8), sufficient for a three-year mine life at a targeted annual mill production rate of about 2308 t of uranium (6 million lb U_3O_8). Total output from five months of production in 2002 was 631 t of uranium (1.64 million lb U_3O_8). It is hoped that the Eagle Point mine will have sufficient ore to feed the Rabbit Lake mill facility until the arrival of supply originating from the Cigar Lake mine, which is targeted for start-up in 2006.

McCLEAN LAKE

Milling of stockpiled ore continued in 2003 at the McClean Lake operation. Total production in 2002 was 2372 t of uranium (6.1 million lb U_3O_8). The mill processed a blend of SUE C deposit low- and high-grade ore and JEB deposit low-grade ore for an average head grade of 1.94% uranium (2.2% U_3O_8). Regulatory approval has been granted to increase annual production to 3077 t uranium (8.0 million lb U_3O_8).

Gold

Claude Resources' Seabee mine, 120 km north-northeast of La Ronge in the central part of the Glennie Domain, completed its 12th year of continuous operation and is Saskatchewan's largest ever primary gold producer. Since production began in 1991, some 2.1 million tons of ore have been mined from above the 600-m level to produce 603 720 oz of gold as of August 31, 2003, from ore averaging 8.32 g/t gold (0.24 oz/ton) with an average recovery rate of 92.1%.

A total of 13 100 oz were sold in the third quarter of 2003, compared with only 10 600 oz in the same period in 2002. Operating costs were US$232/oz for the third quarter and the average realized gold price was US$381/oz. Total annual production in 2002 was 41 500 oz of gold with an average head grade of 6.59 g/t gold (0.19 oz/ton); forecast total annual production for 2003 is 52 000 oz. The target production rate of 550 tons/day was met in the first three quarters of 2003 and a further increase to 700 tons/day will be made after November 1, 2003. Overall, increased ounces and lower production costs in 2003 are the result of mining higher-grade ore combined with efficiency and throughput upgrades made to the mill in 2002. An independent audit in March 2003 reported proven and probable reserves at Seabee of 661 200 t at 8.03 g/t gold (0.23 oz/ton) and inferred resources of 1.42 Mt at 8.0 g/t gold (0.23 oz/ton).

Greater Lenora Resources Inc. (GLR) continued its efforts in 2003 to put the historic Box Gold mine in the heart of the Goldfields camp back into production. The camp is located south of Uranium City in the Beaverlodge district of northwestern Saskatchewan. Work in 2003 focused on securing financing. In October, GLR arranged for a $5 million private placement of Class A and Class B shares to, among other things, initiate work on the Goldfields project. Environmental approvals for the project are pending. GLR obtained the property in 1987 and completed a surface drill campaign in 1994 and 1995, which was the basis for a reserve estimate released in 1998 of 10.8 Mt grading 1.92 g/t gold for Box and 6.54 Mt grading 1.83 g/t gold for the nearby Athona deposit. Targeted production is 2000 t/d using open-pit methods. Ore will be treated by an all-gravity, cold acid leach direct extraction process using Gekko equipment. Gold production will be 45 000 oz/y averaged over 10 years.

Base Metals

In 2002 and 2003, base metals were produced exclusively from the Flin Flon Domain in the east-central part of the province. They were mined from the Konuto Lake deposit and that part of the Callinan deposit in Saskatchewan. The McIlvenna Bay deposit remained dormant in 2003.

The Callinan mine opened in April 1990. Most of the deposit is in Manitoba; only part of the North zone is in Saskatchewan. Total production to the end of 2002 was 5 983 501 t of ore grading 1.41% copper, 3.93% zinc, 2.14 g/t gold and 24.26 g/t silver. As of January 1, 2003, mineable resources in the Saskatchewan part of the North zone were 595 064 t grading 1.15% copper, 3.14% zinc, 1.55 g/t gold and 19.30 g/t silver. Saskatchewan production in the first eight months of 2003 was 54 996 t of ore grading 1.54% copper, 2.53% zinc, 1.54 g/t gold and 14.95 g/t silver.

The Konuto Lake mine opened in 1998 and total production to the end of 2002 was 1 071 942 t of ore grading 4.37% copper, 1.47% zinc, 2.01 g/t gold and 8.63 g/t silver. At January 1, 2003, mineable reserves and resources for the Konuto Lake deposit were 876 558 t of ore grading 3.89% copper, 1.31% zinc, 2.14 g/t gold and 8.63 g/t silver. From January 1 to September 1, 2003, the mine produced 214 400 t of ore grading 3.72% copper, 1.76% zinc, 2.16 g/t gold and 9.81 g/t silver. Production for the remainder of 2003 is estimated at 71 000 t of ore.

There was no work at McIlvenna Bay in 2003. Foran Mining returned the McIlvenna Bay project to Cameco and BHP Billiton Inc. in 2002. The deposit is within Paleoproterozoic volcanic rocks that are the southern extension of the Flin Flon Domain, buried below a cover of Phanerozoic sedimentary rocks. Total combined indicated and inferred resources for the Lens 2 massive sulphide, the Upper West zone and the Lens 3 massive sulphide were increased by 26% in 2000 and are now estimated to be 14.5 Mt grading 6.08% zinc, 0.91% copper, 0.40% lead, 0.45 g/t gold and 23.70 g/t silver.

Summary of Mining Lands Activity

Crown Land Tenure Activity

ACTIVE

A total of 627 new "metallic mineral" dispositions covering 347 886 ha were acquired in calendar year 2002. The majority of the dispositions (approximately 73%) were related to diamond exploration in the surveyed southern part of the province, although on an area basis, the dispositions were equally divided between the surveyed southern part and the unsurveyed northern part of the province. The total number of metallic mineral dispositions in good standing on December 31, 2002, was 3566 covering a total of 2.4 million ha.

The number and area of metallic mineral dispositions has decreased in 2003. As of September 30, there were 3380 dispositions covering 2.1 million ha. Of these, 1812 covering 635 707 ha are related to diamond exploration in the surveyed southern half of the province (Prince Albert area) and 1568 covering 1.48 Mha are in the unsurveyed northern part of the province.

LAPSED/FORFEITED

A total of 518 metallic mineral dispositions (**Table 14**) totalling 463 977 ha lapsed in calendar year 2002. The number of lapsed dispositions was roughly equal between the southern and northern parts of the province; however, the majority of the area (approximately 87%) was in the unsurveyed northern part of the province.

To September 30, 2003, 804 mineral dispositions totalling 490 062 ha have lapsed in Saskatchewan. The majority of the dispositions (approximately 81%) have been in the southern part of the province; however, the majority of the area (approximately 65%) has been in the northern part of the province.

A comparison of the total number and types of active Crown metallic and industrial mineral dispositions are indicated in **Table 14**. There are currently 4319 active mineral dispositions covering 2.5 Mha.

Assessment Work

In 2002, 760 submissions of assessment work were reviewed and $18.1 million in expenditures were approved. Uranium-related assessment work in the Athabasca Basin represented 49% of the approved expenditures and work related to diamond exploration represented 9% of the approved expenditures.

To October 1, 2003, 589 submissions have been reviewed and $10.9 million in assessment work expenditures have been approved. Uranium-related assessment work represents approximately 68% of the submissions, followed by base metals. Diamond drilling constitutes the bulk of the approved expenditures, followed by ground geophysics.

Government Incentive Programs

The Saskatchewan government has implemented a number of new initiatives aimed at increasing exploration activity that may lead to the development of new mines.

Saskatchewan Mineral Exploration Tax Credit (SMETC)

In December 2001, Saskatchewan introduced a new temporary 10% tax credit for eligible flow-through share (FTS) investors of mineral exploration companies active in Saskatchewan. The program parallels the new federal 15% Investment Tax Credit for Exploration (ITCE). The intent of the program is to stimulate grass-roots mineral exploration of principally metallic minerals (including

TABLE 14. SASKATCHEWAN CROWN METALLIC AND INDUSTRIAL MINERAL DISPOSITIONS

Category	December 31, 2002		September 30, 2003	
	(no.)	(hectares)	(no.)	(hectares)
Mineral claims	3 457	2 287 598	3 270	2 081 687
Mineral leases	108	30 955	110	31 192
Permits	22	37 725	17	518
Alkali leases	36	12 700	36	12 700
Coal leases	760	111 872	760	111 872
Quarry leases	115	4 150	114	4 191
Potash leases	12	217 721	12	217 721
Total	4 510	2 702 722	4 319	2 459 881

Source: Saskatchewan Department of Industry and Resources.

diamonds). The non-refundable tax credit applies to investments in flow-through shares of eligible mineral corporations made on or after October 18, 2000, and before January 1, 2005. Eligible funds raised under the program must be spent on eligible exploration activities before January 1, 2006. Summary observations to date include:

- approximately $6.1 million has been raised by FTS offerings that have applied for the SMTEC;
- approximately $244 000 in tax credits has been issued to Saskatchewan taxpayers; and
- uranium and diamonds are the focus of exploration programs that have applied for the SMTEC.

Saskatchewan Mineral Exploration Incentives

In September 2002, the Saskatchewan government announced a six-year, $12.6 million package of mineral exploration incentives that includes:

- Prospectors Incentive Program ($100 000 per year);
- Corporation Exploration Incentive Program ($1.1 million per year);
- Enhanced Geoscience Funding ($400 000 per year) for regional multi-parameter airborne geophysical surveys;
- Ten-year royalty holiday for new gold and base-metal mines;
- Development of a competitive diamond royalty and tax structure; and
- A fuel tax rebate.

The Prospectors Incentive Program offers reimbursement of up to 50% of approved eligible expenditures to a maximum of $7500 per applicant with a maximum of one approved project per applicant per year upon acceptance of a technical report and expenditure statement.

The Corporation Exploration Incentive Program offers reimbursement of up to 25% of approved eligible expenditures to a maximum of $100 000 per applicant with a maximum of one approved project per applicant per year upon acceptance of a technical report and expenditure statement.

In 2002/2003, the first condensed year of the Prospectors Incentive Program, financial assistance totalling approximately $33 000 was provided to six approved applicants. Similarly, in the first year of the Corporation Exploration Incentive Program, financial assistance totalling approximately $648 000 was provided to 10 approved applicants.

2.9 ALBERTA[18]

Overview

While approximately 2.2 million ha were staked in Alberta in 2003, the year was relatively slow from a mineral exploration perspective. Only $590 000 was filed in assessment work in 2003; a substantial decrease from the $12.4 million filed in 2002. The majority of exploration in 2003 continued to focus on diamondiferous kimberlites while other attention was directed at precious- and base-metal deposits in northern Alberta, uranium in the Athabasca Basin in northeast Alberta, and paleoplacer magnetite in southwestern Alberta. As of December 2003, the total area in good standing was approximately 10.6 million ha.

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[18] The Alberta review of activities was prepared by staff of the Alberta Geological Survey, Alberta Energy and Utilities Board, primarily R.A. Olson and D.R. Eccles, and by Brian Hudson, Alberta Department of Energy. For more information, the reader is invited to contact Dr. Olson by telephone at (780) 427-1741 or by e-mail at reg.olson@gov.ab.ca.

Diamondiferous Kimberlites

Up to July 2003, a total of 48 kimberlitic or ultramafic diatremes have been discovered in northern Alberta; these include 2 ultramafic diatremes at Mountain Lake, 38 kimberlite pipes in the Buffalo Head Hills, and 8 kimberlite pipes in the Birch Mountains, which are, respectively, located in northwestern Alberta near Grande Prairie, in north-central Alberta near Red Earth, and in northeastern Alberta northwest of Fort McMurray.

About 80% of the Buffalo Head Hills kimberlites are diamondiferous, which compares very favourably with the 10% diamondiferous pipe ratios that are typical of kimberlite provinces elsewhere. In 2002, Ashton Mining of Canada Inc. (in joint venture with EnCana Corporation and Pure Gold Minerals Inc.) conducted further testing of the K252 and K6 pipes. While 2001 sampling results had been encouraging (estimated 55 ct/ht, including a 9.4-t kimberlite breccia yielding 85.4 ct/ht), 2002 delineation drilling and ground geophysical surveys indicated an areal extent likely less than 2 ha for the K252 pipe. Coupled with a 75-m overburden, this may mean the K252 pipe is too small for commercial development. At the K6 kimberlite, 500 m southeast of K252, a second 5.7-t mini-bulk sample returned an estimated grade of 9.4 ct/ht. As a result of continuing exploration in this region in January 2003, Ashton and its joint-venture partners announced the discovery of two new kimberlites (K296 and K300); both pipes were found by electromagnetic surveys, as was pipe K252, coupled with kimberlitic mineral indicator sampling in tills. Diamond results for K296 are 125 diamonds from a 275-kg sample and for K300 are 54 diamonds from a 170.8-kg sample, with all the diamonds being in the size range from 0.1 to 0.45 mm.

About 50 km north of Ashton's Buffalo Head Hills property, exploration continues on the Elektra property, a joint venture of Marum Resources Inc. (operator), Shear Minerals Ltd. and New Claymore Resources Ltd. Ground geophysical surveys and drilling in 2002, following up on results of an aeromagnetic survey previously flown by New Claymore, yielded no kimberlites. In 2003, Marum re-processed and re-interpreted some prior electromagnetic survey data and has stated that the western half of the Elektra property contains six distinct electromagnetic (EM) anomalies that are represented by sharp vertical breaks in the flat-lying Phanerozoic sedimentary rocks. Two of the EM anomalies are particularly interesting and have been selected for immediate investigation. Marum also stated it had plans to drill selected electromagnetic anomalies in 2003, but so far this work has not been done or reported on.

Various junior exploration companies conducted exploration for diamondiferous kimberlites in other parts of Alberta, including:

- in northeastern Alberta near St. Paul, at the Cold Lake area and south of Lake Athabasca;
- in northwestern Alberta in both the Clear Hills and Chinchaga Hills areas; and
- in north-cental Alberta at Swan Hills and at the northern end of the Buffalo Head Hills.

Precious, Base and Ferrous Metals

With respect to gold/platinum group element/base-metal exploration in Paleozoic and Cretaceous units of northeastern Alberta, Birch Mountain Resources Ltd. focused on independent verification of a precious-metal fire assay for rocks from this area. Under co-development and information-sharing agreements with Suncor Energy Inc., Syncrude Canada Ltd. and Albian Sands Energy Inc., Birch Mountain acquired over 100 oil sands drill cores and well logs. These are being used to identify areas for follow-up exploration, contingent upon availability of a verified assay methodology for the precious metals.

In the same general area, Ateba Technology and Environmental Inc. sampled alluvial sediments along the McIvor River and its tributaries and reported that alluvial gold was present in nearly all heavy mineral concentrates recovered, but grades were low to sub-economic.

Sovereign Mining and Exploration Ltd. collected heavy mineral concentrate samples in the Swan Hills area in north-central Alberta. Sovereign reported that some samples from along the Goose River had gold concentrations approaching levels required for gold placer operations, but the gold is more fine-grained than normal placer gold.

With respect to base metals, collaborative research was completed in early 2003 on the potential for Mississippi Valley Type (MVT) lead-zinc deposits in carbonates in northeastern and northern Alberta. The research is being done by the Alberta Geological Survey within Alberta, the C. S. Lord Geoscience Centre in the Northwest Territories, and the Geological Survey of Canada, under a provincial-territorial-federal Targeted Geoscience Initiative program. Results from this research have been and are being released in 2003 and into 2004.

With respect to ferrous metals, the Clear Hills iron deposits northwest of Peace River continue to be of potential interest. Prior work has identified an iron resource of over 1 billion t at a grade of about 35% FeO in a ferroan oolitic ironstone in the late Cretaceous Badheart formation. Further work is needed to better define this zone and address the complex metallurgy. In 2002, R.T. Owens continued a remediation study focusing on developing a leaching protocol and comparing the results to a fusion protocol.

In southwestern Alberta, Micrex Development Corp. continued work during 2003 on the Burmis paleoplacer magnetite deposits in the Crowsnest Pass. The deposits occur in late Cretaceous Blairmore group sandstone. The Alberta Geological Survey previously identified a resource of about 1.92 Mt grading about 25% iron (Mellon, 1961). Micrex is evaluating whether or not the Burmis deposit can be developed as a source of magnetite product suitable for coal beneficiation. In early November 2003, Micrex announced they had entered the final permitting stage, which includes a mine plan package for government and public review. A public open house to discuss the mining proposal was held in December 2003.

In May 2003, Blue Diamond Mining Corporation (formerly New Blue Ribbon Resources Ltd.) collected two bulk samples from the Pelican Mountains magnetite-ilmenite-rutile (titanium) occurrence, which they interpret to represent a northwesterly trending paleo-beach deposit. The results of this sampling are not yet available.

Uranium

Exploration for uranium within Alberta continues to focus exclusively within the Athabasca Basin, which in Saskatchewan hosts several unconformity-related uranium deposits, including both the largest deposit and mine in the world at McArthur River. About 10% of the Athabasca Basin exists in northeastern Alberta. Prior work at the Maybelle River property led to a drill intersection that assays 21% U_3O_8 across 5 m of core length.

COGEMA Resources Inc. has been exploring its Maybelle River property for several years. COGEMA operates several uranium mines, including the Cluff Lake mine located within the Athabasca Basin in Saskatchewan. During the 1980s, a prior drill program intersected a uraniferous zone at Maybelle River that assays up to 21% U_3O_8 across 5 m of core length. In February and March 2003, COGEMA drilled a total of 3020 m in 15 diamond drill holes at the Maybelle River property to follow up the prior uraniferous intercept. Cogema has reported their drill program at the "very promising Maybelle River target … confirmed fairly shallow mineralization grading up to 40 per cent U_3O_8." The company has stated that additional work is required to determine the full extent of the deposit.

Industrial Minerals and Aggregate

In 2003, Birch Mountain Resources Ltd. applied to develop a limestone quarry at a site on the east side of the Athabasca River, opposite Fort McKay. The surface-mineable oil sands area will soon have a critical shortage of aggregate due to very high demands from both oil sands operations and general construction requirements, resulting in rapid depletion of the existing, limited sand and gravel deposits. Birch Mountain has submitted plans to develop a limestone quarry capable of supplying aggregate to the area for 40 to 50 years. In addition, evaluation testing conducted by Birch Mountain in late 2002 yielded positive calcining test results for the limestone. The company is therefore also considering lime production to meet future demands from oil sands producers for uses such as flue gas desulphurization and water treatment.

Ninety-nine percent of mineral aggregate produced in Alberta is sand and gravel. In 2002, about $235 million of sand and gravel was produced. This comprises about 40 Mt of sand and gravel that is mined from approximately 1000 sand and gravel pits on public land and from 3700 sand and gravel pits on private land. Exploration for aggregates by local, national and international companies is ongoing as resources are rapidly consumed or sterilized due to the continued growth within Alberta.

Assessment Report Submissions for 2003

Table 15 shows Assessment Report submissions for 2003.

TABLE 15. ASSESSMENT REPORT SUBMISSIONS IN ALBERTA, 2003

Total number of permits worked on	44
Hectares worked (no.)	37 932
Work expenditures filed ($)	590 960

Source: Alberta Energy and Utilities Board, Alberta Geological Survey.
Note: Compiled on December 18, 2003.

2.10 BRITISH COLUMBIA[19]

Summary and Outlook

Exploration spending in Canada is increasing and the rate of change in British Columbia is outpacing Canada's. If this two-year growth trend is foreshadowing a new upward cycle of exploration, then British Columbia could benefit substantially. As shown in **Table 16**, spending increased by 35% in 2002 over 2001 and is forecast to increase a further 40-80% in 2003 over 2002. Exploration spending in British Columbia is projected to reach between $55 million and $72 million in 2003. The lower forecast is the Provincial Estimate made in October 2003 and the decrease from $72 million is largely explained by disruptions to exploration activity from the extraordinary occurrence of widespread forest fires.

From empirical observation, major increases in exploration spending are attributed to: 1) increases in mineral commodity prices; 2) world-class discoveries, which attract both international attention and exploration dollars; and 3) the degree to which jurisdictional governments champion exploration, development and mining. British Columbia is benefiting from higher commodity prices and an industry-supportive government. The hope and expectation is that these factors will soon lead to a world-class discovery, or at the very least to new mine developments and/or re-openings.

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[19] The British Columbia review of activities was prepared by Jim Lewis. For more information, the reader is invited to contact Mr. Lewis by telephone at (250) 952-0521 or by e-mail at jim.lewis@gems3.gov.bc.ca.

Compared with Canadian exploration as a whole, British Columbia has three competitive advantages. First, the mineral endowment in the province is highly diverse. Many deposit types exist containing a wide range of different minerals such as base metals, precious metals, platinum group elements, coal, industrial minerals, construction aggregates, etc. This mineral and deposit-type diversity ensures that exploration companies continue spending through different exploration cycles, even when cycles are narrowly focused on a few specific commodities or deposit types. Second, much of the province is little-explored, mountainous Cordilleran terrane. This highly mineralized frontier attracts risk dollars from exploration companies that are searching for superior returns from virgin discoveries. Third, the government is playing a key role in attracting exploration spending as it implements initiatives championing mineral exploration and mine development.

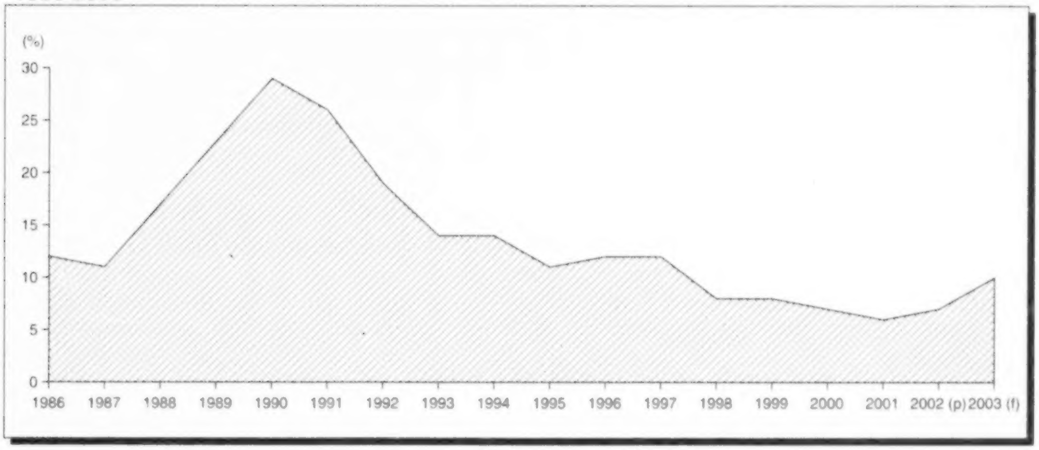
British Columbia's share of Canadian exploration spending over the last decade and a half has ranged from a high of almost 30% in 1990 to a low of 6% in 2001 as shown in **Figure 25**. British Columbia's share of national spending has begun to increase over the past two years from its all-time low. At the projected 2003 spending level of $71.8 million, the province's share will move up to 10%. Even at the lower estimate of $55 million, there is still a significant gain in national share to just over 8%.

TABLE 16. EXPLORATION EXPENDITURES IN BRITISH COLUMBIA, 1997-2003

	1997	1998	1999	2000	2001	2002	2003 (f)
Spending ($ millions)	115.2	54.5	41.3	35.9	29.1	39.2	71.8
Percent change (%)	. .	-53	-24	-13	-19	+35	+83

Source: British Columbia Ministry of Energy and Mines.
. . Not available; (f) Forecast of intentions.
Notes: All figures include exploration and deposit appraisal (and exclude mine complex development). In addition to field work and overhead expenditures, statistics include engineering, economic and feasibility studies, environmental and land access spending. Under an NRCan-B.C. Energy and Mines Memorandum of Understanding, all statistics are referenced from the official federal/provincial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (actual 1997 to 2002 and forecast of intentions (f) in mid-2003) and are the source for Statistics Canada's National Accounts.

Figure 25
British Columbia's Exploration Expenditures as a Percentage of Canada's Total Expenditures, 1986-2003



Source: British Columbia Ministry of Energy and Mines.
(f) Forecast of intentions; (p) Preliminary.

Government Initiatives

The British Columbia government continues to initiate programs and legislation to encourage economic growth in mineral exploration and mining. In the words of the Minister of Energy and Mines, "There is a new free enterprise, pro-mining government in place and we are determined to restore British Columbia to its rightful position as one of the world's most desirable mining locations." Some of the more important actions are:

- Dedicated $2.1 million to the Geological Survey of Canada's Targeted Geoscience Initiatives program for mineral geoscience field surveys in the province and to the *Rocks to Riches Program* managed by the British Columbia and Yukon Chamber of Mines. The Chamber's objective was to generate geoscience information necessary to stimulate new exploration spending. For example, in 2003, two airborne geophysical surveys were completed in highly prospective areas. Results are targeted for release in March 2004.

- Extended the British Columbia Mining Exploration Tax Credit Program. This program provides a 20% refund credit for qualified expenses not funded by flow-through shares in addition to the 15% federal tax credit and the 100% deduction of Canadian Exploration Expense. In 2003, British Columbia has Canada's second most attractive exploration tax incentive program.

- Exempted production machinery and equipment used in mining from provincial sales tax. This measure encourages British Columbia mines to invest in modern equipment as required to remain profitable.

- Created an MLA (Member of the Legislative Assembly) Task Force on Mining, which toured the province focusing on legal, regulatory and policy changes needed to further revitalize the mining industry in British Columbia. Recommendations from the Task Force are due by year-end 2003.

- Promoted global investor awareness of the excellent mineral exploration and development opportunities that exist in British Columbia through a delegation to London. Delegates included the Minister, ministry staff, and representatives from junior and mid-range mining companies, the British Columbia and Yukon Chamber of Mines, the Tahltan First Nation, and the Toronto Stock Exchange.

- Updated geoscientific maps, files and databases, which serve tens of thousands of clients online. More popular files include MapPlace, MINFILE, CoalFile and ARIS (Assessment Report Index System), which are explained and found at www.em.gov.bc.ca/geology.

- Established a two-zone system for mining land use, which aims to increase tenure, access and permitting certainty by clearly identifying what provincial lands are open to mining.

- Established clear emission standards for coal-fired power generation to facilitate the development and expansion of the coal industry.

- Supported a prospector's field school run through a joint venture between the British Columbia Institute of Technology and the British Columbia and Yukon Chamber of Mines.

- Implementing an on-line Mineral Titles system. This system will enable clients to secure mineral claims through Internet map selection and eliminate the physical effort and costs involved in claim staking.

Statistical Trends In British Columbia's Exploration Sector

As worldwide exploration spending swings widely from lows to highs over the longer term, British Columbia generally follows suit. Even during the worst of the low spending periods within these swings, the province has maintained a healthy balance in the allocation of exploration funds. In this report, exploration balance refers to a number of dimensions that help offset deposit discovery risks, including the range of minerals targeted, the diversity of deposit types examined, the breadth of spending from preliminary to advanced project phases and the geographical distribution of activities. These factors and the trends associated with them are highlighted by the graphs in this section. The data for the plots come from both federal/provincial survey statistics and data collected by the British Columbia Ministry of Energy and Mines.

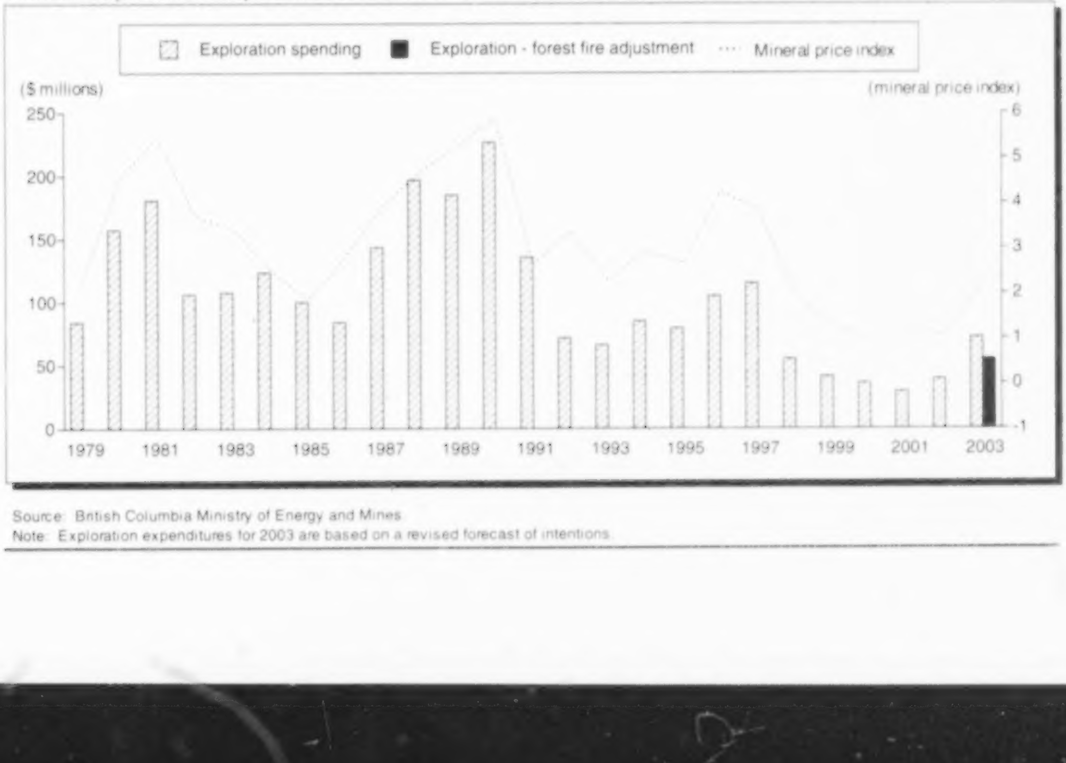
The magnitude of exploration spending is largely a function of mineral price levels. This relationship is partly verified by econometric modeling where mineral prices have provided a reasonable predictor of exploration spending. The British Columbia mineral price index model, made up of copper, zinc, lead, gold, silver and metallurgical coal (i.e., those commodities accounting for 80% of provincial mineral sales), predicted $75 million in exploration spending for 2003, as shown in **Figure 26**. The close match of this prediction to the forecast of intentions of $71.8 million tends to verify the strong link between price levels and exploration activity.

Figure 27 plots yearly changes in the mineral commodities that are highly important to British Columbia. Copper, gold and zinc prices all increased between 8% and 12% in 2003 and coal at least maintained constant price levels since its increase in 2001. A sustained two-year increase in the price of gold coupled with predictions for world economic growth bode well for the continued strengthening of exploration activity in British Columbia.

Although the number of mining operations in British Columbia has been declining in recent years, the province has also benefited from stronger metal prices. As a result, mineral sales have maintained levels of nearly $3 billion. There is an expectation that the world economy will sustain these higher mineral price levels even if the U.S. dollar begins to rise and that British Columbia will attract increased exploration spending, particularly as more deposits are explored and new mines are developed.

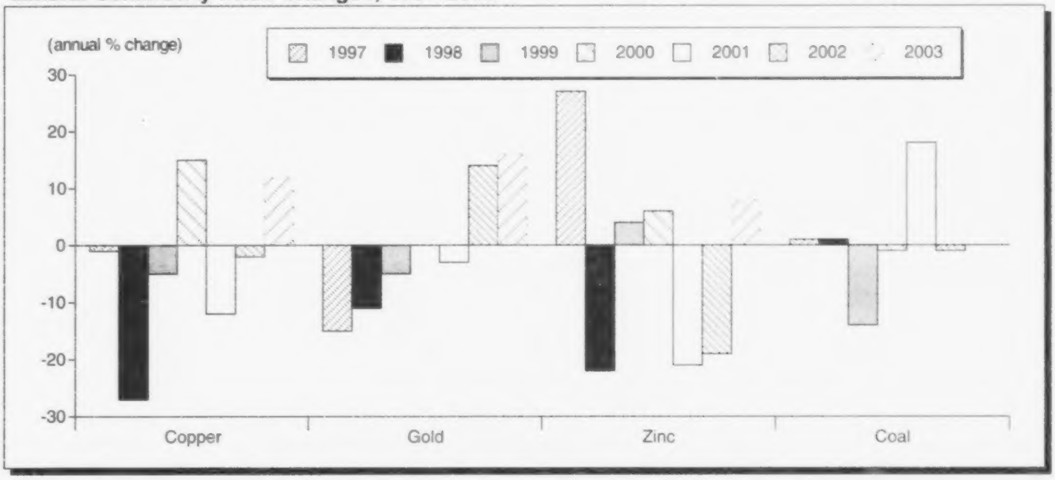
Traditionally, mineral claim units staked, Free Miner Certificates (prospector's licences) issued and Notices of Work (permit applications) have served as additional indicators of exploration activity. The percent change in these indicators year-on-year is plotted along with the change in exploration

Figure 26
Annual Exploration Expenditures and British Columbia's Mineral Price Index, 1979-2003



Source: British Columbia Ministry of Energy and Mines
Note: Exploration expenditures for 2003 are based on a revised forecast of intentions

Figure 27
Mineral Commodity Price Changes, 1997-2003



Source: British Columbia Ministry of Energy and Mines.

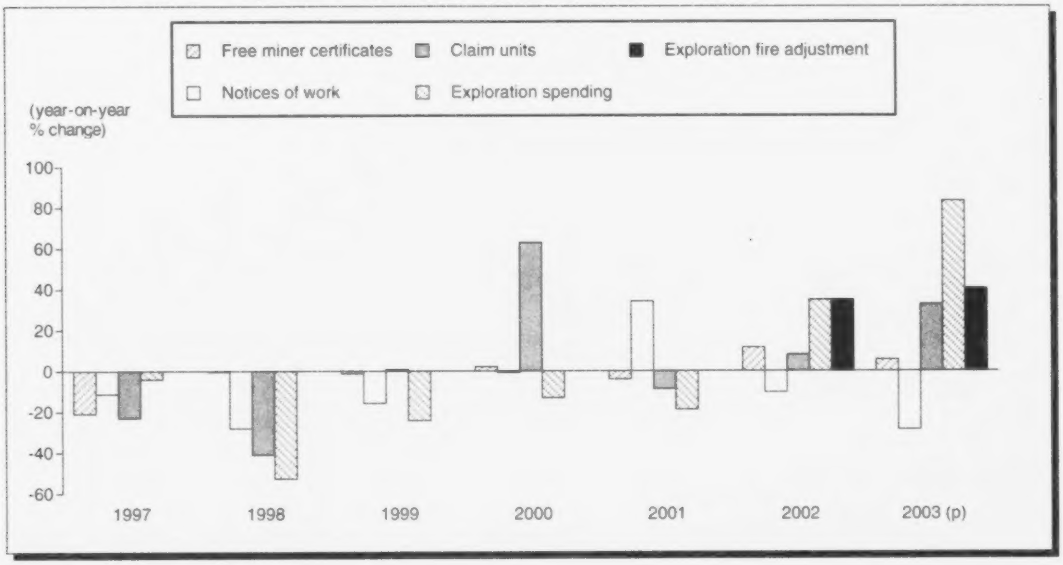
spending in **Figure 28**. Claim units staked correlate with exploration expenditures and reflect the stronger growth in exploration activity in 2002 and 2003 in British Columbia. In recent years, any correlation between Notices of Work or Free Miner Certificates and exploration spending has diminished. This is likely due to the presence of fewer but larger projects as companies focus on advanced projects.

Figures 29, 30, 31 and **32** look at key exploration trends as plotted from federal/provincial and ministry-surveyed data. These graphs highlight: 1) the healthy impact of the larger overall spending during the past two years on different aspects of exploration; 2) the balanced and well-diversified allocation of these exploration funds to different minerals, deposit types, and phases of exploration; and 3) the healthy presence and balance of big, medium-sized and smaller corporate spenders. The strong diversity of exploration projects reflects a healthy range of participation in the industry by prospectors, independent geologists, junior exploration companies, local and multinational mining corporations, and other explorationists alike. The magnitude and balance, or diverse allocation, of exploration spending are seen as key elements for stimulating and progressing towards new discoveries, reactivating old mines with new reserves, developing new mines, and ultimately re-establishing growth in the province's mining sector.

Spending over the past six years on six of the main deposit types explored in British Columbia is shown in **Figure 29**. While the major share of exploration spending is on metals, the figure shows that industrial minerals receive a steady allocation of spending and that, on average, spending on coal maintains a base level of over $3 million. The downward trend in coal exploration is seen as a temporary aberration resulting from the consolidation of the Southeast coal mines into one company, Elk Valley Coal Partnership, and the recent closures of the Bullmoose and Quintette mines. New coal projects are under way so this trend is expected to reverse. All metal deposit groups show strong increases in spending over the past two years and top expenditure rankings move fluidly amongst porphyry, vein and massive sulphide deposit types from one year to the next.

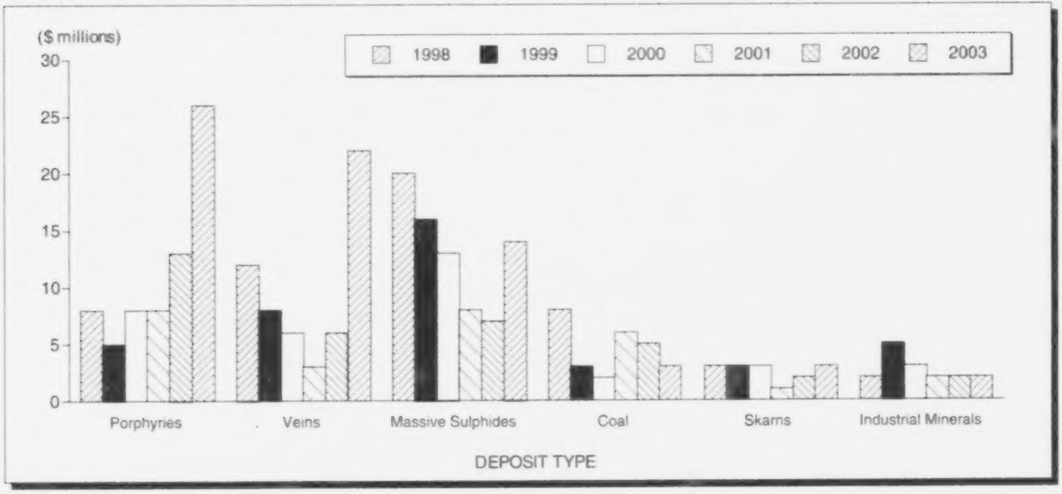
Spending by phase of exploration is illustrated in **Figure 30**. Most important, exploration and deposit appraisal spending are increasing in 2002 and 2003. The strong increase in deposit appraisal expenditures is a good sign of imminent new mine development. Higher mine complex development spending in 1997 and 1998 reflects the final phases in bringing the Huckleberry, Mount Polley and Kemess South mines into production. The uniform mine complex development expenditures from 1999 to 2002 typically reflect base spending by mines to maintain reserves.

Figure 28
Exploration Activity in British Columbia as Indicated by Free Miner Certificates, Claim Units, Notices of Work and Exploration Spending, 1997-2003



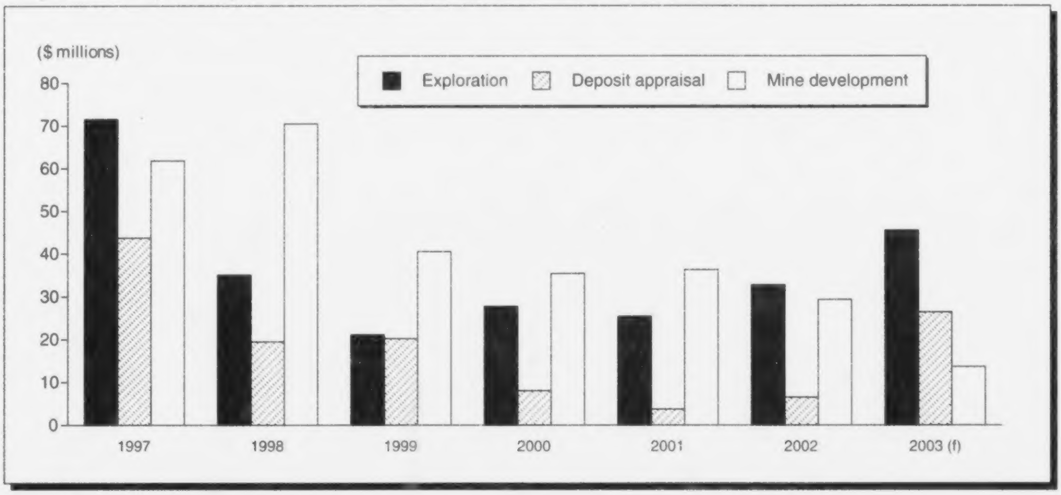
Source: British Columbia Ministry of Energy and Mines.
(p) Preliminary.

Figure 29
Exploration Spending in British Columbia, by Deposit Type, 1998-2003



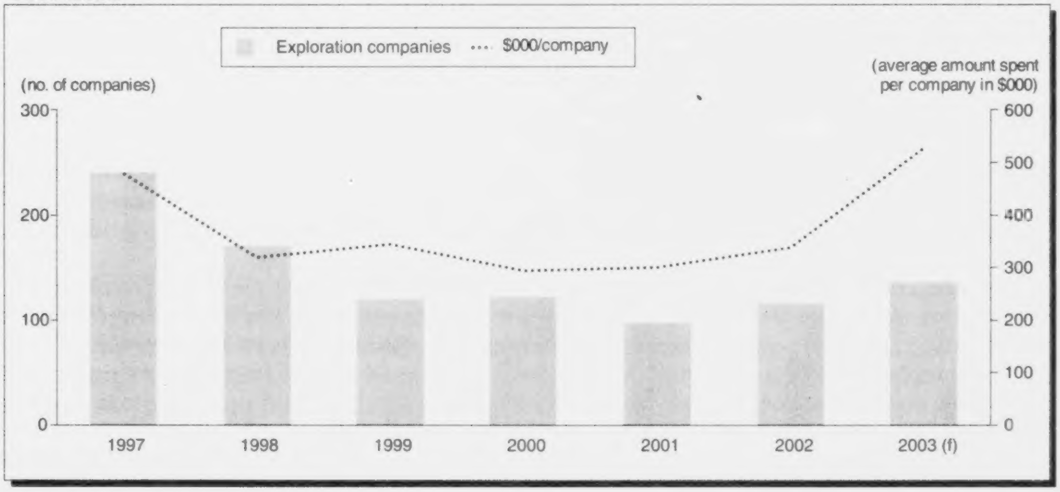
Source: British Columbia Ministry of Energy and Mines.

Figure 30
Exploration Spending in British Columbia, by Work Phase, 1997-2003



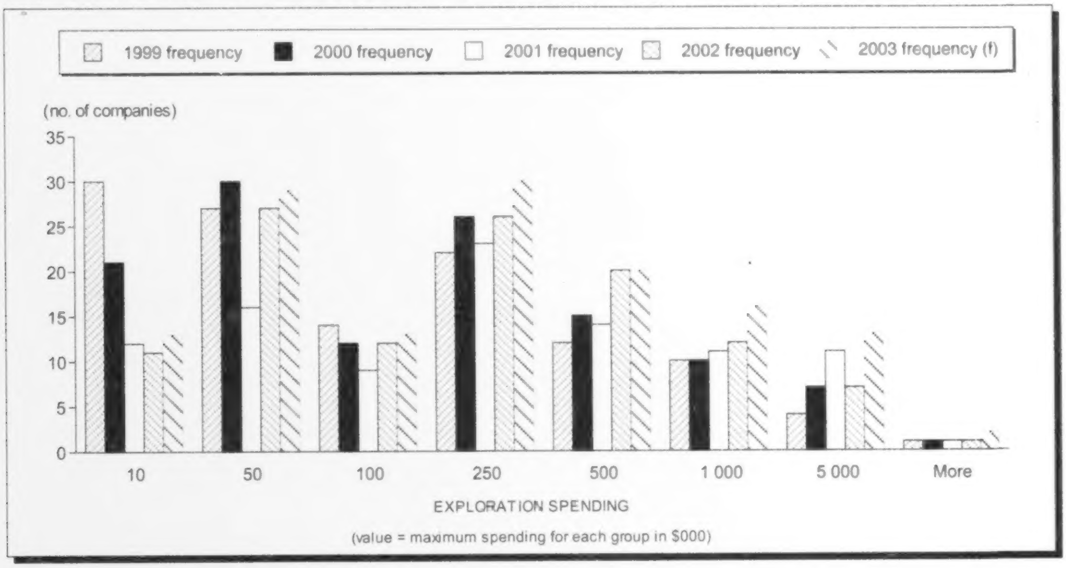
Source: British Columbia Ministry of Energy and Mines.
(f) Forecast.

Figure 31
Number of Exploration Companies and Average Amount Spent Per Company in British Columbia, 1997-2003



Source: British Columbia Ministry of Energy and Mines.
(f) Forecast of intentions.

Figure 32
Exploration Companies in British Columbia, Grouped by Range of Spending, 1999-2003



Source: British Columbia Ministry of Energy and Mines.
(f) Forecast.

Figure 31 shows that both the number of companies exploring in British Columbia and the average expenditures per company have increased in 2002 and 2003. Higher commodity prices and progressive government programs are responsible for the nearly 20% increase in the number of companies and the projected average expenditure per company of over $0.5 million.

Figure 32 highlights the number of big, medium-sized and smaller spenders. The distribution of corporate exploration spending by amount is well balanced amongst the groupings and maintains this consistent pattern over the last five years. In 2003, increased spending is projected for every group. Corporate budgets are most common at the $100 000 to $250 000 level and the number of companies, group by group, falls off at higher levels of expenditure. Note that every year there are always companies that spend more than $5 million each. Prospectors and smaller exploration programs tend to cluster around the $10 000 to $50 000 level.

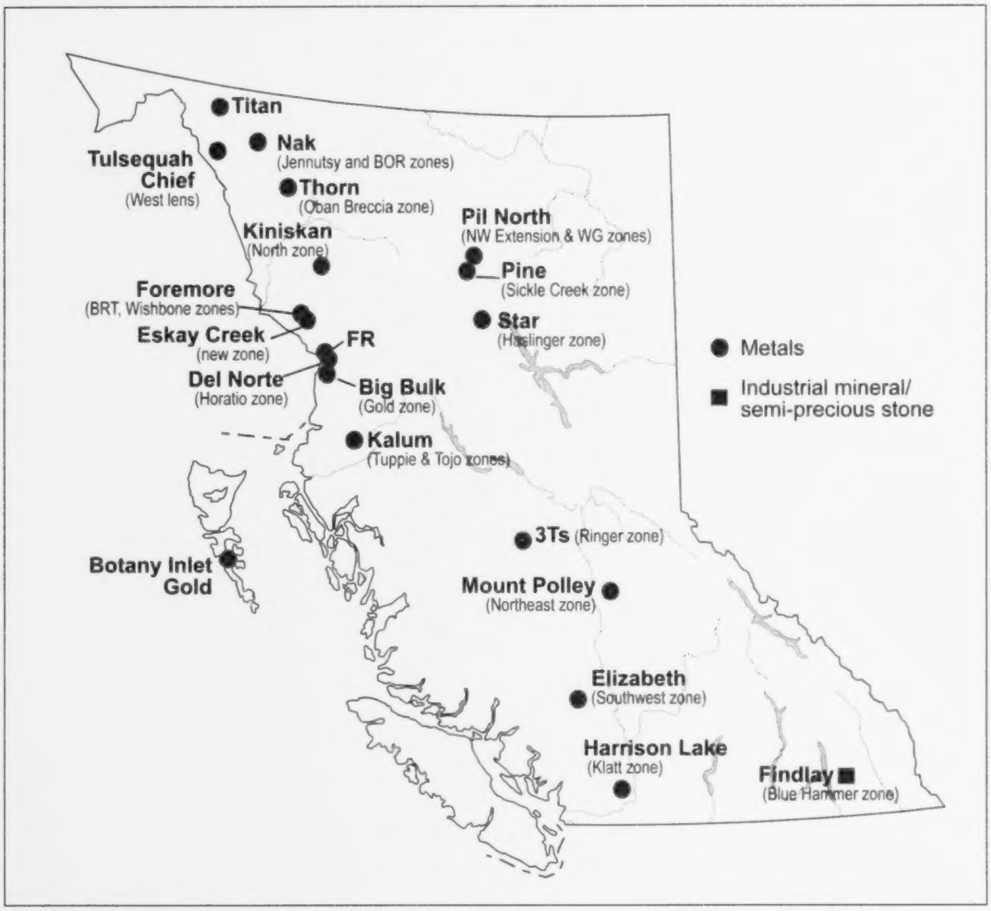
Exploration Highlights

In British Columbia, two years of increasing metal prices and exploration spending have expanded exploration efforts to focus on reactivating old mines, rejuvenating dormant projects and allocating large budgets to explore for new discoveries. New discoveries for 2003 are shown on the map in **Figure 33.**

In addition, two airborne geophysical surveys were completed in highly prospective areas in 2003 as part of the Rocks to Riches Program. Results are targeted for release in March 2004 with the hope that they will stimulate new exploration, which will lead to further new discoveries.

By calendar year-end 2003, an estimated 140 companies will have actively explored over 300 projects in British Columbia. The anticipated top 50 spenders are highlighted in **Table 17** and on the map in **Figure 34**. Of these exploration projects, 20 are marked in the table with the letter "P" for "pre-feasibility equivalent-stage or better" to indicate activities such as bulk sampling, advanced deposit appraisal, test mine, test market, etc., or even the pre-mine construction stage. Since these

Figure 33
New Discoveries in British Columbia, 2003



Source: British Columbia Ministry of Energy and Mines.

highly advanced projects, many of which have remained dormant for several years, are becoming an important new focus on exploration in the province, **Table 18** and the map in **Figure 35** outline 50 more of these "pre-feasibility equivalent-stage or better" projects that were not in the "big spender" group for 2003. In general, these projects comprise a major component of British Columbia's documented mineral inventory and hold important, and often near-term, development potential. While too numerous to discuss here, most of the exploration projects listed in **Tables 17** and **18** will be described in detail in the ministry publication, *British Columbia Mineral Exploration Review – 2003,* also accessible on the ministry web site at www.em.gov.bc.ca/Mining/Geolsurv/Publications/catalog/catexrev.htm.

The following discussion highlights a few exploration projects that emphasize the strength and diversity of some of the near-term production possibilities.

Plans and tentative plans for production are already in place for a number of projects. Compliance Coal Corporation's Basin Coal mined about 20 000 t of thermal coal this year for sales to a cement plant and local greenhouses. It plans to mine a further 75 000 t in 2004 and is conducting a pre-feasibility study for a 50-megawatt thermal coal/wood-fired generating plant. Permits are in place

TABLE 17. ANTICIPATED PROJECTS THAT WILL ATTRACT HIGHER LEVELS OF EXPLORATION SPENDING IN BRITISH COLUMBIA IN 2003 AND/OR 2004

	Exploration Projects	Company/Operator	Targeted Commodity	Deposit Setting
METAL PROJECTS				
	3Ts (Tsacha, Tam, Taken)	Southern Rio	Au, Ag	Vein-epithermal
	Afton Region	Abacus Minerals Corporation	Cu, Au, Pd, Ag	Porphyry
p	Afton/Ajax	DRC Resources Corporation	Cu, Au, Pd, Ag	Porphyry
	Big Bulk	Canadian Empire Exploration Corp.	Au, Ag, As, Sb, Hg, Zn	Porphyry
p	Bralorne	Bralorne-Pioneer Gold Mines Ltd.	Au	Vein-mesothermal
p	Cariboo Gold Quartz	International Wayside Gold Mines Ltd.	Au	Vein-mesothermal
	Clone	Lateegra Resources Corp.	Au, Ag	Vein-mesothermal
p	Cogburn	Leader Mining International Inc.	Mg, Cu, Ni, PGE	Industrial mineral
	Del Norte Ck.	Lateegra Resources Corp.	Au, Ag	Vein-mesothermal
p	Elk/Siwash	Almaden Minerals Ltd.	Au	Vein-mesothermal
p	Eskay Creek	Barrick Gold Corporation	Au, Ag	Volcanogenic massive sulphide
	Fanny Bay	Castillian Resources Corp.	Au, Ag	Vein-mesothermal
	Foremore	Roca Mines Inc.	Zn, Pb, Ag, Ba	Volcanogenic massive sulphide
p	Galore Creek	SpectrumGold	Au, Cu	Porphyry
p	Gibraltar	Taseko Mines Limited	Cu, Mo	Porphyry
	Harrison Lake/Abo	Northern Continental Resources Inc.	Au,	Volcanogenic/porphyry
	Heritage	Heritage/Kinross	Au, Ag	Volcanogenic massive sulphide
	Homestake Ridge	Teck Cominco Ltd.	Au, Ag, Zn	Volcanogenic massive sulphide
	Indata	Castillian Resources Corp.	Cu, Au	Porphyry
p	Kemess North	Northgate Exploration Ltd.	Au, Cu	Porphyry
	Lookout/Bar	Chapleau Resources Ltd.	Au	Vein-mesothermal
p	Lustdust	Alpha Gold Corporation	Au, Ag, Cu, Zn	Skarn-manto
p	Morrison	Pacific Booker Minerals Inc.	Cu, Au	Porphyry
p	Mount Polley	Imperial Metals Corporation	Cu, Au	Porphyry
	Myra Falls	Boliden Westmin Canada Limited	Au, Ag, Cu, Zn	Volcanogenic massive sulphide
	Myrtle-Proserpine	Gold City Industries Ltd.	Ag, Pb, Zn	Vein-mesothermal
	Nak (Joss'alun)	Imperial Metals Corporation	Cu	Volcanogenic massive sulphide
	Panorama Ridge	Goldcliff Resource Corporation	Au, Cu	Skarn
	Pil	Finlay Minerals	Cu, Au	Porphyry
	Pine	Stealth Minerals Ltd.	Au, Cu	Porphyry-skarn
	Praxis	Praxis Goldfields Inc.	Au, Ag	Volcanogenic massive sulphide
p	QR	Cross Lake Minerals Ltd.	Au	Skarn
	Randi	Locke Goldsmith	Au, Ag	Vein-mesothermal
p	Red Chris	BC Metals Corporation	Cu, Au	Porphyry
	Taurus	Navasota Resources Ltd.	Au, Cu	Vein-mesothermal
	Thorn	Rimfire Minerals Corporation	Cu, Au, Ag	Vein-epithermal
	Tommy Jack	International Kodiak	Au, Ag	Vein-mesothermal
	Tulameen	Bright Star Ventures Ltd.	PGE	Magmatic PGE
p	Tulsequah Chief	Redcorp Ventures Ltd.	Cu, Pb, Zn, Au, Ag	Volcanogenic massive sulphide
	Turnagain River	Canadian Metals Exploration Ltd.	Ni, Co, Cu	Magmatic PGE
	Vowell Creek	Jasper Mining Corporation	Pb, Zn, Ag, Au	Vein-mesothermal
	William's Gold	Stikine Gold Corporation	Au	Vein-mesothermal
	Zinger	Alamos Minerals Ltd.	Au	Vein-mesothermal
COAL PROJECTS				
	Burnt River	Western Canadian Coal Corp.	Coal-met	Coal
	Coal Mountain Operations	Elk Valley Coal Partnership	Coal-met	Coal
	Line Creek Operations	Elk Valley Coal Partnership	Coal-met	Coal
p	Pine Valley	Pine Valley Coal Ltd.	Coal-met	Coal
p	Trend	Goldbank Ventures Inc.	Coal-met	Coal
INDUSTRIAL MINERAL PROJECTS				
p	Apple Bay	Homegold Resources	Silica/kaolin	Industrial mineral
p	Black Crystal Graphite	Crystal Graphite Corporation	Flake graphite	Industrial mineral

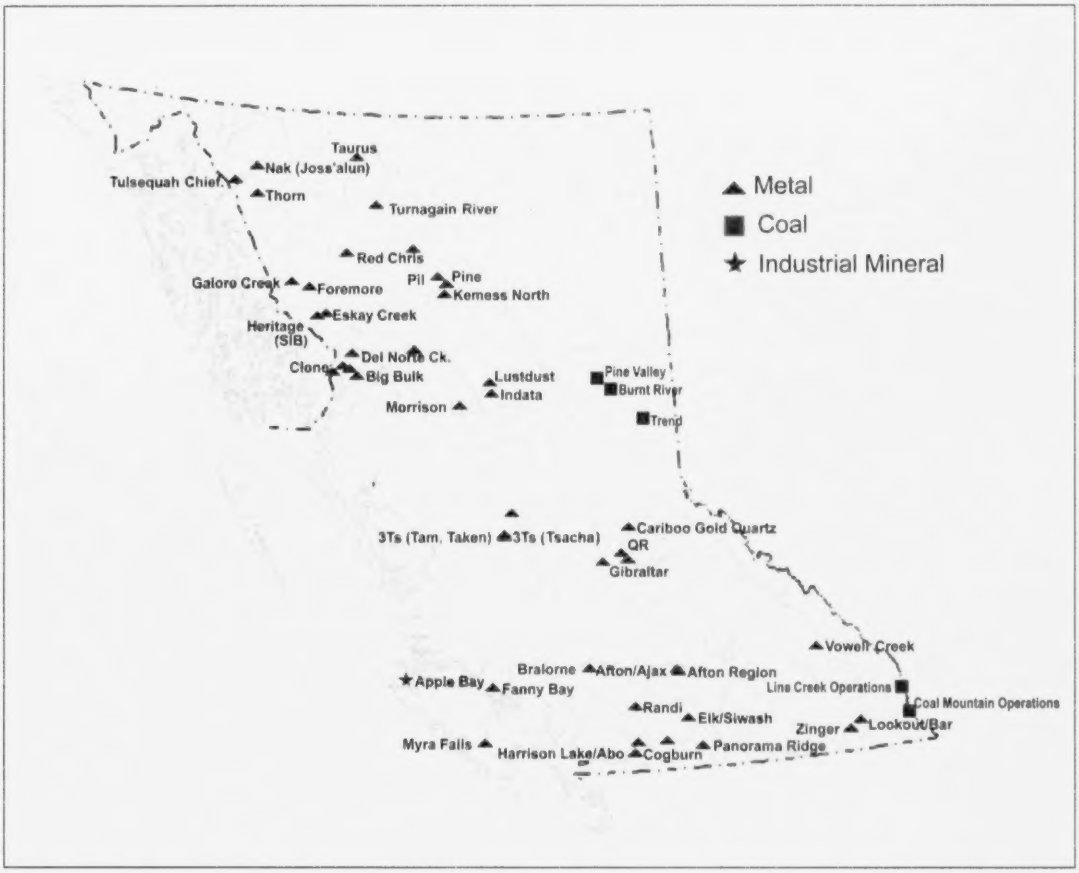
Source: British Columbia Ministry of Energy and Mines.

p = Pre-feasibility equivalent-stage projects.

Ag Silver; Au Gold; Ba Barite; Co Cobalt; Cu Copper; Hg Mercury; Mo Molybdenum; Ni Nickel; Pb Lead; Pd Palladium; PGE Platinum group elements; Zn Zinc.

Note: The project list was developed from publicly available data and from company contacts, up to October 2003.

Figure 34
Location of Projects Anticipated to Attract Higher Levels of Exploration in British Columbia, 2003 and/or 2004



Source: British Columbia Ministry of Energy and Mines.

for Pine Valley Mining Corporation's Willow Creek coal mine. The company is waiting for a revised feasibility study and is planning for production in 2004. Western Canadian Coal Corp.'s Perry Creek Coal has submitted a mine plan to the Environmental Assessment Office and plans production in 2005. Eagle Rock Materials Ltd.'s Eagle Rock Quarry has permits in place to mine and export crushed rock to the California market. Once financing is in place, it anticipates shipping 4-6 Mt/y.

Other projects have completed actions more akin to mine development than exploration. Bralorne Pioneer Gold Mine Ltd. is undertaking tailings pond and mill construction. Almaden Minerals Ltd.'s Elk (Siwash North) gold project is in the definition drilling stage and has purchased a gravity flotation mill. International Wayside Gold Mines Ltd.'s Cariboo Gold Quartz project is conducting extensive underground bulk sampling.

Projects such as Sustut copper-gold and Cogburn magnesium-nickel-copper-platinum group elements have already completed positive feasibility studies. Sustut may process its ore at the Kemess South mine and Cogburn is looking for a joint-venture partner to share in the cost of the mine development phase.

TABLE 18. PROJECTS REPRESENTING "MINERAL INVENTORY" AT THE "PRE-FEASIBILITY EQUIVALENT STAGE" OR BETTER, 2003

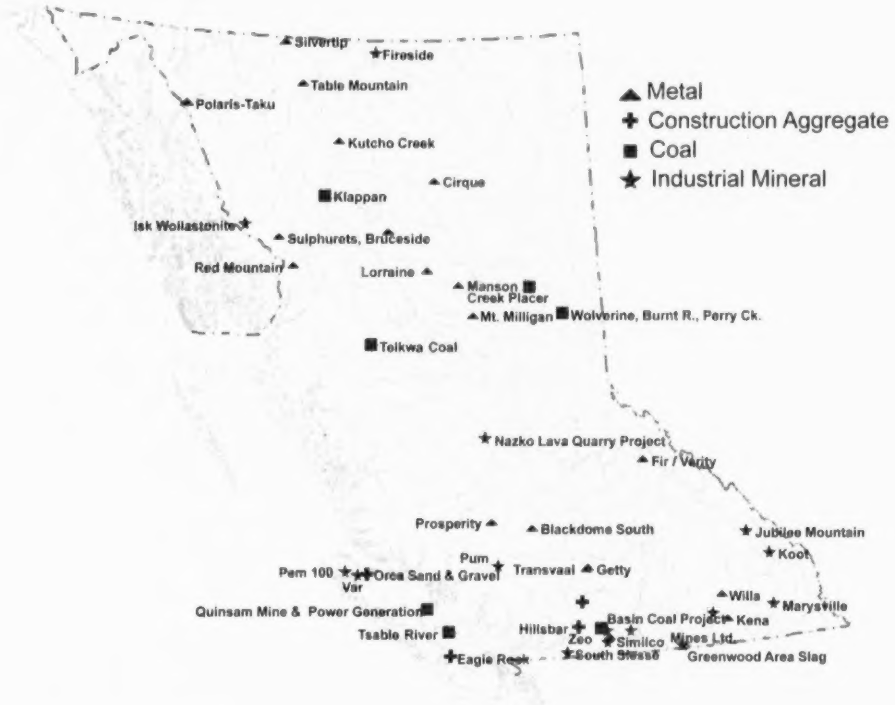
Project/Mine Development	Company/Operator	Targeted Commodity	Deposit Setting
METALS			
Blackdome South	Claimstaker Resources Ltd.	Au	Vein-epithermal
Cirque	Cirque Operating Corporation	Pb, Zn, Ag	Sedimentary exhalative
Getty	Getty Copper Corporation	Cu	Porphyry
Kena	Sultan Minerals Inc.	Au	Porphyry
Kutcho Creek	Western Keltic Mines Inc.	Cu, Zn, Ag, Au	Volcanogenic massive sulphide
Lorraine	Eastfield Resources Ltd.	Cu, Au, Ag	Porphyry
Manson Creek Placer	Angel Jade Mines Ltd.	Au	Placer
Mt. Milligan	Placer Dome	Cu, Au	Porphyry
Polaris-Taku	Canarc Resource Corporation	Au, Ag	Vein-mesothermal
Prosperity	Taseko Mines	Cu, Au	Porphyry
Red Mountain	Seabridge Resources	Au	Porphyry
Silvertip	Imperial Metals Corporation	Ag, Pb, Zn	Skarn, manto
Similco Mines	Leader Mining International Inc.	Au, Ag	Porphyry
Sulphurets, Bruceside	Silver Standard	Au, Ag	Vein-mesothermal
Sustut	Doublestar Resources Ltd.	Cu, Ag	Porphyry
Table Mountain	Cusac Gold Mines Ltd.	Au	Vein-mesothermal
Transvaal	Getty Copper Corporation	Cu, Au	Porphyry
Willa	Orphan Boy Resources	Au, Cu	Porphyry
COAL			
Basin Coal Project	Compliance Energy Corp.	Coal	Coal
Elk Valley Coal Partnership and Power Generation	Elk Valley Coal/Fording Partnership	Coal and coal-fired power	Coal
Klappan	Fortune Minerals Limited	Coal-anthracite	Coal
Quinsam Mine & Power Generation	Hillsborough Resources Limited	Coal and coal-fired power	Coal
Sable River	Hillsborough Resources Limited	Coal-therm	Coal
Sage Creek	Cline Mining Corp.	Coal	Coal
Telkwa Coal	Elk Valley Coal Corporation	Coal-met, therm	Coal
Willow Creek Coal	Pine Valley Coal Ltd.	Coal-met, therm	Coal
Wolverine, Burnt R., Perry Ck.	Western Canadian Coal Corp.	Coal-pci	Coal
INDUSTRIAL MINERAL PROJECTS			
Blu Star	Anglo Swiss Resources	Gemstones, sapphire	Gemstone deposit
Crystal Peak Garnet Project	Polestar Exploration Inc.	Garnet	Industrial mineral
Fir/Verity	Commerce Resources Corporation	Ta, Nb	Carbonatite
Fireside	Fireside Minerals Ltd.	Barite	Industrial mineral
Greenwood Area Slag	Roxul (West) International Inc.	Slag	Industrial mineral
Isk Wollastonite	Whitegold Resource Corp.	Wollastonite	Industrial mineral
Jubilee Mountain	Tiger Ridge Resources Ltd.	Barite	Industrial mineral
Koot	Westroc Inc.	Gypsum	Industrial mineral
Marysville	Stralak Resources	Magnesite	Industrial mineral
Nazko Lava Quarry	Canadian Pumice Corporation	Pumice, aggregate	Industrial mineral
Pem 100	Homegold Resources	Silica	Industrial mineral
Pum	Great Pacific Pumice Ltd.	Pumice	Industrial mineral
South Slesse	Homegold Resources & I.G. Machine and Fibers Ltd.	Limestone	Industrial mineral
Sunday Creek	Canmark International Resources Inc.	Zeolite	Industrial mineral
Var	Graymont Western Canada Inc.	Chemical limestone	Industrial mineral
Zeo	Zeo-Tech Enviro Corp.	Zeolite	Industrial mineral
CONSTRUCTION AGGREGATE PROJECTS			
(Port Renfrew)	Southern Pacific Development Corp.	Sand and gravel	Construction aggregate
Eagle Rock	Eagle Rock Materials Ltd.	Crushed granite	Construction aggregate
Hillsbar	Qualark Resources Inc.	Sand and gravel, gold	Construction aggregate, placer
Orca Sand & Gravel	Polaris Minerals Corp. and Kwakateil Band	Sand and gravel	Construction aggregate
Teko	BC Rail and Ministry of Transport	Crushed stone	Construction aggregate

Source: British Columbia Ministry of Energy and Mines.

Ag Silver; Au Gold; Co Cobalt; Coal-poi Pulverized coal injection, coal; Cu Copper; Hg Mercury; Mo Molybdenum; Ni Nickel; Pb Lead; Zn Zinc.

Notes: (1) "Pre-Feasibility Equivalent Stage" includes advanced projects which have many, but not all of the attributes (e.g., proven reserves, market potential, viable mine plan; power and transport infrastructure; commodity price levels; available financing, etc.) required to complete a bankable feasibility and construction decision. These projects have achieved some mine potential results reflecting any number of advanced stage indicators, e.g., are in the application to certification stage of the Environmental Assessment process, completed pre-feasibility studies, test mines, product-market testing and bulk sample analysis, are currently mined intermittently, dormant mines with reserves, etc. (2) The project list was developed from publicly available data and from company contacts, up to October 2003.

Figure 35
Location of Projects Representing "Mineral Inventory" at the "Pre-Feasibility Equivalent Stage" or Better, in British Columbia, 2003



Source: British Columbia Ministry of Energy and Mines.

Several of the large-scale (some temporarily dormant) gold-copper porphyry projects are seeing renewed exploration activity with the hope for near-term production. They include the Red Chris, Afton, Kemess North, Galore Creek, Gibraltar, Mount Polley and Morrison projects.

With over 40 industrial mineral operations currently producing and an abundance of mineral potential, the province is in a strong position to expand this sector considerably. Currently the more significant industrial minerals mined in British Columbia are magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum, sulphur and construction aggregates. Additional but smaller-scale operations produce nephrite jade, magnetite, dolomite, barite, volcanic cinder, pumice, flagstone, clay, tufa, fuller's earth and zeolites. Vast potential exists for expanding the reach of many of these minerals into not only other geographic markets, but also through product research and development into other industry sectors.

Conclusions and Future Outlook

There are strong indications that a new phase of exploration and ultimately production in British Columbia's mineral economy is superseding the net mine closures of recent years. Exploration spending has doubled over the past two years and gold and other mineral prices have increased substantially. British Columbia's government is increasingly supportive of exploration and mine development. Many current projects exhibit telling characteristics of near-term mine development. There is every reason to believe that British Columbia is finally experiencing a new up-cycle of exploration and reactivation of old exploration and mine development projects as indicated by: 1) the dynamic changes in the breadth and depth of provincial exploration; 2) the magnitude of increased exploration spending over the past two years; and 3) projections for the continued strengthening of world mineral demand.

British Columbia is strategically positioned with a vast mineral endowment, excellent infrastructure, transport and support services, and a proven track record for over a century and a half of making exploration discoveries, developing and operating mines, and rewarding investors. Integrating all of these attributes with a more supportive government, it is suggested that British Columbia will experience continued growth in exploration spending and new mine development.

2.11 YUKON[20]

2003 Overview

The search for emeralds and the rise in the price of gold has fueled an increase in mineral exploration expenditures in the Yukon. Exploration for base metals was directed mainly toward copper (with significant gold credits), while zinc, lead and nickel received little attention. Expenditures are estimated at over $13 million, up from the $7.2 million spent in 2002. Claim staking remained healthy in 2003 with 2816 claims staked to the end of October and, for the first time in five years, claims in good standing posted an increase to 43 314 claims to the end of October. The number of projects involving diamond drilling has remained the same as in 2002. However the total metres drilled has increased to 15 641 m, an increase of over 50% from the 2002 total. Unfortunately, there has been no hard rock mining or mine development taking place.

Mines and Mine Development

In 2003, no hard rock mining or mine development took place in the Yukon. Several projects are fully permitted but are on hold awaiting an increase in the price of metals.

Placer Mining Industry

Placer mining continued to be an important contributor to the Yukon economy in 2003. Approximately 125 mines directly employed 400 people. In small population centres, such as Dawson City and Mayo, the placer industry is a major contributor to the local economy. The majority of active placer mining operations were in the Dawson mining district (83) followed by the Whitehorse mining district (32) and the Mayo mining district (10).

Yukon placer gold production in 2003 (to the end of October) totalled 49 658 crude oz (1 544 500 g) compared to 66 346 crude oz (2 063 600 g) in 2002, which represents a 25% decrease. The total dollar value of Yukon placer gold produced in 2003 was approximately $20.1 million, down from the $25.8 million generated in 2002.

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[20] The Yukon review of activities was prepared by Mike Burke. For more information, the reader is invited to contact Mr. Burke by telephone at (867) 667-3202 or by e-mail at Mike.Burke@gov.yk.ca.

Exploration

The largest exploration program in the Yukon was the Regal Ridge project of True North Gems in which $2.1 million was dedicated to the evaluation of an emerald occurrence first discovered in 1998. Exploration for additional occurrences of emeralds in a similar geologic setting to Regal Ridge (intrusive-related quartz-beryl veins) was conducted mainly in the surrounding Finlayson Lake district. Several new areas have been identified, the most significant being the True Blue prospect. Deep blue-coloured beryl discovered at the True Blue property have been identified as a unique form of aquamarine and is currently being evaluated to determine if the stones may be a new species of gemstone.

Gold exploration in the Yukon focused mainly on intrusion-related gold systems within the Tintina gold province, which comprises several mineral-rich districts that are coincident with extensive regions of mid-Cretaceous plutonism. The geological knowledge of intrusion-related gold systems has advanced dramatically over the last 10 years while exploration for gold in these systems has been at historical lows. This has resulted in very few advanced exploration programs that have been able to adequately drill test the numerous targets within the Tintina gold province in the Yukon. The continued strengthening of the gold price, recent discoveries and positive results from current exploration programs all indicate that the Yukon is poised for a return to healthy exploration levels.

New discoveries continue to be made by companies and prospectors active in the Yukon. The Finlayson Lake volcanogenic massive sulphide district continued to produce new discoveries. Hinterland Metals and Firestone Ventures both discovered gold mineralization on their claims while exploring for emeralds in the Finlayson Lake district. True North Gems also reported the discovery of high-grade copper mineralization in massive sulphide float that returned values of 6.59% copper, 0.46% lead, 4.61% zinc, 240 g/t silver and 0.45 g/t gold while exploring for gemstones in the Finlayson Lake district. True North Gems identified three new emerald-bearing zones on its Regal Ridge property and announced the discovery of a blue-coloured beryl, identified as a unique form of aquamarine, on its True Blue property. Prospector Shawn Ryan rediscovered a high-grade mesothermal quartz-gold vein on his White claims, first noted in an 1897 report by William Ogilvie. The number of projects involving diamond drilling did not increase in 2003; however, the total drilling footage increased by 50%, illustrating the ability of companies to raise enough funds to complete sizeable exploration programs. No percussion or reverse circulation drilling was carried out this year. Exploration results for several of the advanced projects carried out in theYukon were not yet released by year-end.

A more comprehensive overview highlights a number of exploration projects conducted in the Yukon during the 2003 field season and is available on the Yukon Geological Survey web site at www.geology.gov.yk.ca. Detailed property descriptions are commonly available on company web sites and in documents filed electronically for the System for Electronic Document Analysis and Retrieval ((SEDAR) at www.sedar.com. Yukon MINFILE, the Yukon's mineral occurrence database, also contains detailed descriptions of many of the occurrences described herein. This is available on CD-ROM and also on the Yukon Geological Survey's web site.

Yukon Government

Devolution Transfer Agreement and the Yukon Geological Survey

Eleven years ago, the Canada-Yukon Geoscience Office opened its doors and marked the beginning of a *de facto* Yukon Geological Survey (YGS) with the creation of the Yukon Geology Program. In April 2003, that vision finally became a reality when responsibilities for management of the Yukon's natural resources devolved from the federal government to the Government of Yukon. The

Department of Energy, Mines and Resources now has responsibility for minerals, oil and gas, forestry, agriculture and lands. The new Yukon Geological Survey supercedes the Geology program. YGS is part of the Minerals Development Branch and is co-managed by Grant Abbott and Rod Hill under the direction of Jesse Duke. The Geological Survey integrates the Exploration and Geological Services Division (EGSD) of the Department of Indian Affairs and Northern Development (DIAND) with the Yukon Geoscience Office, the Mineral Assessment Group and the Yukon Mining Incentives Program (YMIP) of the Department of Energy, Mines and Resources (EMR) of the Yukon government. The Geological Survey of Canada (GSC) also maintains an office with the YGS. Funding for the YGS remains at the same level as it was in previous years for the Geology program. This year, in addition to core funding, the YGS benefited from additional short-term funding from DIAND through the industry-led Northern Geoscience Initiative and through the Knowledge and Innovation Fund. The last federal budget renewed the Natural Resources Canada Targeted Geoscience Initiative for two more years. The Yukon government will see substantial funding this year, with YGS as a partner.

The YGS is committed to providing a balanced complement of field projects that not only quickly stimulate mineral and hydrocarbon exploration, but also take the longer-term view towards developing an understanding of the Yukon's regional geological framework and building the Yukon Geoscience database. With the increasing volume of information generated by YGS and others, and rapidly evolving digital technology, the YGS has placed more effort and resources into making geological information more accessible. A large part of its effort has gone into developing and maintaining key databases and making all of its information Internet-accessible. Ongoing activities include support for the H.S. Bostock Core Library and the EMR Library.

Yukon MINFILE, the Yukon's mineral occurrence database, was updated and released in 2003. The database now contains 2603 records, of which 500 have been revised, and is complete to the end of 2001. All mineral occurrences are now assigned to a deposit model. Reserve tables have been completely revised and updated to match, as closely as possible, the Canadian Institute of Mining Standards for Reporting Mineral Resources and Reserves.

The Yukon Placer Database was released in the fall of 2002. The database is in Microsoft Access 2000 format and is a comprehensive record of the geology and history of Yukon placer mining. The database contains descriptions of 440 streams and rivers and 1356 associated placer occurrences. It also includes location maps in Portable Document Format (PDF). An update is scheduled for the spring of 2004.

The Yukon GEOPROCESS File is an inventory of information on geological process and terrain hazards, including 1:250 000-scale maps showing permafrost, landslides, recent volcanic rocks, structural geology, and seismic events, and also includes references and summaries of bedrock and surficial geology. The GEOPROCESS File is intended as a planning aid for development activities and is available for most areas south of 66^{o} latitude. The maps are now standardized in colour and are available on a single compact disk. Maps with text are in AutoCAD 2000 and PDF formats.

The Yukon Digital Geology compilation was updated this year by Steve Gordey and Andrew Makepeace of the Geological Survey of Canada with funding from YGS. It includes syntheses of bedrock geology and glacial limits, compilations of geochronology, paleontology, and mineral occurrences, and a compendium of aeromagnetic images. All are now available on CD-ROM. Bedrock geology and glacial limit paper maps are also available at 1:1 000 000 scale.

The Yukon Regional Geochemical Database 2003 contains all of the available digital data for regional stream sediment surveys that have been gathered in the Yukon under the Geological Survey of Canada's National Geochemical Reconnaissance Program. It is available on CD-ROM in Microsoft Excel 2000 format and in ESRI ArcView Shape file format.

The YukonAge 2002 Database, compiled by Katrin Breitsprecher and Jim Mortensen at the University of British Columbia with funding from YGS, can now be viewed on the YGS map gallery in a version modified by Mike Villeneuve and Linda Richard with the Geological Survey of Canada. The database contains over 1500 age determinations derived from over 1100 rock samples from the Yukon in both Microsoft Access 2000 format and as a flat file in Microsoft Excel 2000 format so that the data may be viewed without Microsoft Access. The database will be updated in the spring of 2004.

The Yukon Geoscience Publications Database is current to 2003 and contains more than 5000 references to papers on Yukon geology and mineral deposits, including YGS publications.

The H.S. Bostock Core Library contains about 128 000 m of diamond drill core from about 200 Yukon mineral occurrences. Confidentiality of material is determined on the same basis as mineral assessment reports. Confidential core can be viewed with a letter of release from the owner.

The YGS distributes information in three formats. It sells and distribute paper maps and reports through the Geoscience Information and Sales Office. In addition, many of its recent publications and databases are available in digital format at considerably lower prices than for paper copies. Most of the publications are available as PDF files on its web site (www.geology.gov.yk.ca) free of charge. A directory of assessment reports is also available on-line. The YGS is pleased to make spatial data available through its interactive map server; the Map Gallery can be accessed through the YGS web site. The YGS continues to improve the Map Gallery and has added coverages of regional stream geochemistry, mineral claims and geochronology to the existing coverages of regional geology, MINFILE locations, topography, roads and communities, and First Nations Land selections. Vector data can now be clipped and downloaded. Planned enhancements include the addition of geophysics and paleontology and the addition of more attribute data to existing coverages.

Yukon Mining Incentive Program

The Yukon government continued to support the mineral exploration industry by funding the Yukon Mining Incentive Program. In 2003, $987 000 was offered to 61 successful applicants. The function of the program is to provide a portion of the risk capital required to locate and explore for mineral deposits in the Yukon. The program comprises the following four modules:

GRASS-ROOTS PROSPECTING

Qualified prospectors may apply for a contribution of up to $10 000 per year to cover basic operating expenses while searching for new mineral occurrences in the Yukon. All of the approved expenses are reimbursed.

GRASS-ROOTS-GRUBSTAKE

Companies or individuals providing prospectors with a grubstake (basic operating expenses while searching for new mineral discoveries in the Yukon) may apply for a contribution of up to $10 000 per person per year. A total of 75% of approved expenses is reimbursed.

FOCUSED-REGIONAL

Individuals, partnerships or junior companies undertaking basic exploration work directed at appraising the potential of an under-explored area on crown land may apply for a contribution of up to $15 000 per year. Under this program, 75% of approved expenses are reimbursed.

TARGET EVALUATION

Individuals, partnerships or junior companies undertaking basic exploration work directed at appraising the potential of an under-evaluated occurrence or target may apply for a contribution of up to $20 000 per year. The intent of this funding is to allow prospectors to evaluate new occurrences following discovery and to prepare them for option or sale. Half of the approved expenses are reimbursed.

YUKON MINERAL EXPLORATION TAX CREDIT

The Yukon government also supports the industry through the Yukon Mineral Exploration Tax Credit, which provides a 25% tax refund on eligible exploration expenditures (effective until March 31, 2004). The tax credit is under review and the effective date is anticipated to be extended.

Land Claim Agreements

Eight Yukon First Nations (Nacho Nyak Dun, Teslin Tlingit Council, Champagne and Aishihik First Nation, Vuntut Gwichin First Nation, Little Salmon/Carmacks First Nation, Selkirk First Nation, Tr'ondëk Hwëch'in and the Ta'an Kwach'an Council) have finalized their land claims in the Yukon and have final and self-government agreements in effect. The Kluane First Nation has finalized its claim and its final and self-government agreements will come into effect on February 2, 2004. The Carcross/Tagish First Nation and the Kwanlin Dun First Nation have finalized their land claims and will vote on ratification of their final and self-government agreements in 2004. The White River First Nation is working on completing the details of its claims so that it may finalize and move towards ratification in 2004. The Liard First Nation and Ross River Dena Council are not presently negotiating their claims with Canada and the Yukon and there is no timetable for reactivating the tripartite negotiation table; however, the Yukon has entered into some interim measures agreements with those First Nations to facilitate development in the southeast Yukon.

2.12 NORTHWEST TERRITORIES[21]

Introduction

The Northwest Territories constitutes 13.48% of Canada's total landmass and its geological record spans billions of years. The territory is richly mineralized, hosting a wide variety of commodity types. For many years, precious and base-metal mines formed the mainstay of the territories' mining industry. However, the industry is now centred on the emerging diamond mines, which are set to play a major role in the territories' economy for many years to come.

On April 1, 1999, the territory of Nunavut came into existence, along with the new Northwest Territories. Ekati, Canada's first diamond mine, reached full production during the same year. Diavik, Canada's second diamond mine, commenced operations in January 2003.

Mineral Production Summary

The total value of metal and diamond shipments from the Northwest Territories increased to $901.13 million in 2001 from $685.16 million in 2000. The rise can be ascribed to an increase in diamond production (3.7 million versus 2.5 million ct, respectively), partially offset by a decrease in diamond prices. The value of gold shipments remained relatively static at around $55 million. A small amount of silver was also produced.

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[21] This review was prepared by the Minerals, Oil and Gas Division of the Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories. For more information, the reader is invited to contact Christy Campbell by telephone at (867) 920-3345 or by e-mail at christy_campbell@gov.nt.ca.

Diamond shipments accounted for 94% of the total value of metal and nonmetal production in the Northwest Territories in 2001 with gold making up most of the remainder. The territory accounted for 100% of Canadian diamond production and for around 3% of gold production during the same period. The CanTung tungsten mine was re-opened in 2002.

Producing Mines

As of October 1, 2003, there were five operating mines in the Northwest Territories: the Con and Giant gold mines, the Ekati and Diavik diamond mines, and the CanTung tungsten mine.

Underground operations at the Con mine situated on the outskirts of Yellowknife were terminated on November 28, 2003, and the CanTung mine was shut down on December 5, 2003.

The value of gold and diamond shipments from the Northwest Territories over the five years to 2002 is depicted below. The graph (**Figure 36**) shows the extent to which diamonds have superceded gold as the most important mineral produced in the Northwest Territories in recent years.

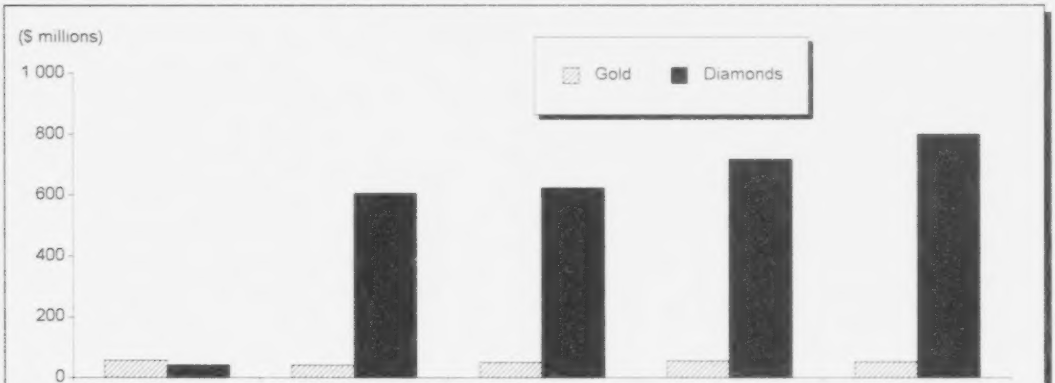
Con and Giant Mines (Miramar Mining Corporation, 100%)

The Con mine began operating in 1938 and has produced 5.5 million oz of gold to date. The Giant mine was brought into production in 1948 and has produced over 7 million oz of gold.

Operations at the Con mine were suspended due to a labour dispute from May 1998 to April 1999. Mining resumed in July 1999 under a five-year plan. In December 1999, Miramar Giant Mine Ltd. was formed as a subsidiary of Miramar Mining Corporation to acquire the assets of the Giant mine from the Department of Indian Affairs and Northern Development (DIAND).

In December 1999, the Con autoclave was successfully recommissioned to process refractory ore concentrates. By mid-February 2000, the autoclave was consistently processing 500 tons per day of refractory ore from both the Con and Giant mines.

Figure 36
Value of Gold and Diamond Shipments from the Northwest Territories, 1998-2002



Source: Northwest Territories Department of Resources, Wildlife and Economic Development

On June 22, 2001, Miramar gave notice that it would return the Giant mine property to DIAND on December 14, 2001. Subsequently, the company reached an agreement with DIAND to extend operations at Giant until late 2002. DIAND agreed to cover the costs associated with environmental compliance and holding that were previously the responsibility of Miramar Giant, totalling some $300 000 per month.

On August 27, 2003, Miramar issued a press release stating that underground mining operations at Con were to be terminated as of November 30, 2003. The Giant mine is slated to close in mid-2005.

Production statistics for the Con and Giant mines are presented in **Table 19** while reserve estimates for the Giant mine, as at December 31, 2002, are shown in **Table 20**.

Ekati Mine (BHP Billiton Diamonds Inc.-80%, C. Fipke-10% and S. Blusson-10%)

The Ekati diamond mine was opened on October 14, 1998, in the sub-Arctic barrenlands of the Northwest Territories, 300 km northeast of the city of Yellowknife. Some 150 kimberlite pipes have been identified on the property and 20 of these have been bulk sampled. Of the 20 pipes, 8 are in the current mine plan.

There are 58 Mt of ore grading 0.9 carats per tonne (ct/t) left to mine (1 ct = 0.2 g). Open-pit operations are currently under way at the Panda, Misery and Koala pipes, while the Koala North pipe is being exploited by underground methods. Pre-stripping is under way at the Fox pipe.

The mine plan calls for 4.2 Mt of ore to be processed in fiscal year 2003 with some 5 million carats (Mct) of diamonds being produced. Over 45 Mt of waste will be removed during the same period.

TABLE 19. PRODUCTION STATISTICS FOR THE CON AND GIANT MINES, NORTHWEST TERRITORIES, 2000-2005

	2000	2001	2002	2003 (e)	2004 (e)	2005 (e)
Gold production (oz)	121 874	129 607	115 134	95 000	37 500	22 500
Operating costs (US$/oz)	264	256	247	350	350	350

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on company information.
(e) Estimated.
Note: Mining operations at the Con mine are planned to terminate on November 30, 2003.

TABLE 20. ESTIMATED RESERVES (1) FOR THE GIANT MINE, NORTHWEST TERRITORIES, AS OF DECEMBER 31, 2002

Tonnage	Grade	Quantity of Gold	
(t)	(g/t)	(kg)	(oz)
92 000	11.36	1 051	34 000

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on company information.
(1) The reserve estimates are based on a US$308/oz gold price.

The ore is currently being processed at an average rate of 12 000 t/d, up from the original 9000 t/d as indicated in the feasibility study. Further increases in throughput are envisaged. The mine is slated to cease production in 2014.

Ekati currently produces around 5 Mct/y of predominantly gem and industrial-quality diamonds, about 4% of current global production by weight and 6% by value.

Annual production statistics for Ekati are tabulated in **Table 21**.

Diavik Mine (Diavik-60%, Aber-40%)

Permitting and licensing approvals were obtained from the federal government in late 1999 for the Diavik diamond mine. Construction of the mine, at a cost of $1.25 billion, was completed in January 2003. During the 2001 winter road season, 4089 truckloads of fuel, construction materials and equipment were hauled to the project site. Another 3000 truckloads of supplies reached the mine site during the 2002 winter road season.

Reserves are estimated at 27.1 Mt grading 3.9 ct/t, making the deposit one of the richest in the world. A 20-year mine life is envisaged with diamond production averaging 5.4 Mct/y. Diamond prices over the life of the mine are expected to be US$66.57/ct (in 2003 dollars).

Diavik commenced production in January 2003. The mine produced 1.2 Mct of diamonds to the end of July 2003. Aber received US$96.22/ct for the first parcel of diamonds sold by the company.

CanTung Mine (North American Tungsten-100%)

North American Tungsten owns both the CanTung mine and the MacTung deposit, located in the Deh Cho and Sahtu regions, respectively. Both are situated on the Northwest Territories/Yukon border and, in 2002, contained approximately 15% of the Western World's known tungsten resources.

The CanTung mine operated from 1962 to 1986; it was subsequently closed due to low commodity prices and placed on care and maintenance. The MacTung deposit is undeveloped at this time but contains substantial reserves of tungsten.

CanTung resumed operations in January 2002. Production statistics for the mine are presented in **Table 22**.

TABLE 21. PRODUCTION STATISTICS FOR THE EKATI DIAMOND MINE, NORTHWEST TERRITORIES, 1998-2002

Year	Diamond Production	Value of Production
	(000 ct)	($ millions)
1998	278	55.93
1999	2 496	606.25
2000	2 533	624.78
2001	3 691	717.78
2002	4 975	800.02

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on company information.

TABLE 22. PRODUCTION STATISTICS FOR THE CANTUNG TUNGSTEN MINE, NORTHWEST TERRITORIES, 2002 AND 2003

	Year Ended September 30, 2002	Nine Months Ended June 30, 2003
MTU (a)	228 676	289 000

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on company information.

(a) 1 MTU = 10 kg of tungsten concentrate.

In January 2003, North American Tungsten reported that tungsten production at the CanTung mine had exceeded, by 33%, the amount called for in the 2002 mine plan. This resulted in the production of more tungsten concentrate than the company was contractually obliged to supply to its existing customers. North American Tungsten determined that the sale of this excess material on the world market was not feasible given the prevailing low market prices. Consequently, the company decided to reduce production by shutting down the mine for five weeks commencing March 6, 2003. Operations were resumed on April 9, 2003.

In 2002, the Mackenzie Valley Land and Water Board (MVLWB) ruled that North American Tungsten's application for an extension to their water licence should be referred for a full environmental assessment by the Mackenzie Valley Environmental Impact Review Board. The company asked for a judicial review in the Northwest Territories of this decision.

At a judicial review in November 2002, the Supreme Court of the Northwest Territories upheld the decision of the MVLWB. The existing water licence was extended to November 2003 to cover the environmental assessment period. North American Tungsten, believing that the Supreme Court erred in making its decision, initiated an appeal to the Court of Appeal of the Northwest Territories.

On March 31, 2003, the Northwest Territories Court of Appeal set aside the decision of the Supreme Court and ruled that the CanTung mine did not need an environmental assessment to extend the existing water licence. As a result, North American Tungsten's application for a renewal of the CanTung water licence has now proceeded directly before the MVLWB.

2003 Exploration Summary

Exploration expenditures in the Northwest Territories are expected to total $56.1 million in 2003, a significant drop from the $72.7 million spent in 2002. However, grass-roots exploration expenditures in 2003 are expected to be similar to those of 2002, i.e., around $30 million. Deposit appraisal expenditures for 2003 are expected to total $25.9 million, significantly down from the $43.6 million spent in 2002. (Deposit appraisal includes engineering studies, environmental studies and additional drilling to firm up on grade and tonnage estimates of known mineral deposits, while grass-roots exploration involves the discovery of new mineral deposits.)

Exploration and deposit appraisal expenditures for Canada as a whole are expected to total $684 million in 2003. Expenditures in the Northwest Territories therefore account for around 8.2% of the total.

The more advanced mineral exploration and development projects in the Northwest Territories are detailed in **Table 23**.

Work was carried out on 40 exploration projects in the Northwest Territories in 2002. Of this total, 27 projects were focused on diamonds and 13 on various metals (i.e., precious metals, base and steel industry metals, industrial minerals).

Diamonds

Diamond exploration highlights and developments for 2003 to date are as follows:

- De Beers Canada received a positive recommendation from the Mackenzie Valley Environmental Impact Review Board for its Snap Lake project. The Board recommended to the Minister of Indian and Northern Affairs that the project proceed to the regulatory phase of approvals. The mine is now expected to commence production in late 2006/early 2007.
- Mountain Province Diamonds reported on modeled revenue per tonne and grade estimates for the 5034 and Hearne diamond pipes at Kennady Lake obtained by its joint-venture partner, De Beers Canada. The 5034 pipe returned an average modeled value per carat of US$62.70, slightly

TABLE 23. ADVANCED MINERAL EXPLORATION AND DEVELOPMENT PROJECTS IN THE NORTHWEST TERRITORIES, 2003

	Commodity	Owner	Tonnage (Mt)	Grade
Snap Lake	Diamonds	De Beers 100%	22.80	1.46 ct/t diamonds
Kennady Lake	Diamonds	De Beers 51% Mountain Province 44.1% Camphor 4.9%	14.04	(a) 1.64 ct/t diamonds
Damoti Lake	Gold	Doublestar Resources 100%	0.46	15.97 g/t gold
Discovery Mine/Nicholas Lake	Gold	Tyhee Development 100%	1.34	(b) 11.67 g/t gold
NICO	Cobalt, gold, bismuth	Fortune Minerals 80% CANDOU 20%	16.33	1.31 g/t gold 0.13% cobalt 0.16% bismuth
Prairie Creek	Zinc, lead, silver	Canadian Zinc 100%	11.80	12.5% zinc 10.1% lead 161 g/t silver
Howard's Pass	Zinc, lead	Placer Dome 51% Cygnus Minerals 49%	113.40	5.4% zinc 2.1% lead
Lake Zone, Thor Lake	Tantalum	Rare Metal Alloys 100%	65.00	0.03% Ta_2O 0.4% Nb_2O_5
"M" Zone, Hart Property	Zinc, lead silver, gold	Tri-Star Syndicate 51% Solid Resources 49%	1.20	5.10% zinc 2.2% lead 337 g/t silver 0.6 g/t gold

Source: Northwest Territories Department of Resources, Wildlife and Economic Development.
(a) Indicated resources for the 5034 and Hearne pipes only. (b) Measured and indicated resources only.

lower than the average value of US$65.50 obtained in August 2001. The Hearne pipe returned an average modeled value per carat of US$50.00, which is significantly lower than the US$63.30 obtained previously. However, De Beers has started work on a cost estimate for a prefeasibility study as the diamond market has subsequently strengthened. The cost estimate will be presented to the De Beers Board in November 2003 and, if approval is given, a prefeasibility study will start in early 2004. De Beers will also continue with exploration in the adjacent Kelvin-Faraday area with the objective of adding to the existing resource.

- New Shoshoni Ventures completed three diamond drill holes to test the newly discovered kimberlite now known as DB-2 on its Drybones Bay property near Yellowknife. The second hole intersected 286 feet (ft) of kimberlite material at a depth of 489 ft and the third hole intersected a total of 430 ft of kimberlite from a downhole depth of 373 ft.

- Diamondex Resources carried out exploration on its Lena West project in the Sahtu. A total of 1018 stream sediment samples were collected from which two diamonds were recovered. The diamonds, measuring 0.8 mm and 0.6 mm respectively in their longest dimensions, were taken from two separate drainage areas.

- Archon Minerals is drill testing the WO9 kimberlite, discovered last summer, in the Lac de Gras area.

Precious Metals

Gold exploration highlights and developments for 2003 to date are as follows:

Fortune Minerals intersected additional high-grade results on its NICO gold deposit 160 km northwest of Yellowknife where a 35-hole drill program is testing extensions of the deposit for feasibility studies. One hole intersected 31.1 g/t gold, 0.37% cobalt and 0.03% bismuth over 1 m within a broader 6-m intersection averaging 8.28 g/t gold and 0.11% cobalt, within an even larger 17.7-m interval averaging 3.4 g/t gold and 0.09% cobalt. The company recently released results of an economic assessment of NICO indicating that the deposit could be profitably mined.

Seabridge Gold reported favourable results from a sensitivity study on its Courageous Lake gold deposit and that it would proceed with an economic assessment of the property. The resource now stands at 7.5 million oz from a previously reported 5.7 million oz. The resource increase is due to a reduction in the estimated cutoff grade from 1.5 g/t to 1.0 g/t, reflecting favourable preliminary reports on mining and metallurgy.

Base Metals

Base-metal exploration highlights and developments for 2003 to date are as follows:

Fronteer Development reported that the potential for iron oxide-copper-gold mineralization had been confirmed on its four Bear Province properties in the Northwest Territories. For example, a sample from a historical trench (looking for uranium) returned 10.3% copper and 4.0 g/t gold. The company has entered into discussions with major international mining companies for further exploration of these properties.

Industrial Minerals

No exploration work of significance has been carried out on industrial minerals in the Northwest Territories during 2003.

2003 Government Programs (C.S. Lord Northern Geoscience Centre)

The C.S. Lord Northern Geoscience Centre (the Centre) houses geologists from the federal and territorial governments under one roof where they combine their resources and talents to provide geoscientific knowledge and research for the Northwest Territories. The Centre employs 18 full-time and several part-time staff.

The Centre's programs relate to both mining and petroleum geoscience and provide public access to Indian and Northern Affairs Canada's (INAC) collection of assessment reports, drill hole cores, and rock samples. Scientific programs in 2003 included a geological mapping project at Wecho River, diamond studies, two large compilation projects, and a major aeromagnetic survey in preparation for future fieldwork. Programs were developed in consultation with its various clients and reviewed with all staff. A review was presented to the Centre's Joint Advisory Committee on November 18, 2003, prior to the annual Geoscience Forum.

Financial

An initial budget of $3.1 million for salaries and operations for fiscal year 2003/2004 was increased to $5.2 million by the addition of special operating funds provided by INAC, and to a lesser extent by Natural Resources Canada. Core funding was split 30/70 between the Government of the Northwest Territories and INAC.

Data Access

The Centre houses reports and drill core that have been submitted by the mining exploration industry and has acquired digital versions of similar petroleum industry data. Much of these data are in the public domain and are therefore available to explorers and scientists. The Centre is over halfway through a multi-year project to scan the minerals data and make them available in a digital format either on CD or through Web access. Web access will enable potential investors worldwide to assess opportunities in the Northwest Territories.

Wecho River

A two-year project to conduct geological mapping and mineral deposit studies began in 2003 in the Wecho River area, 100 km north of Yellowknife. The project will improve mineral exploration strategies in a region that had last been mapped over 50 years ago. The first year of field mapping has been completed and covered 2500 km^2.

CanTung and Selwyn Basin

Fieldwork for a one-year study of the CanTung mine deposit and a scoping study for future work in the Selwyn Basin (southern Mackenzie Mountains) have been completed.

South Wopmay and Ennadai Areas

Preliminary compilations and field reconnaissance work have begun in preparation for future multi-year projects in these areas. New funding from INAC enabled the Centre to undertake a large, high-resolution aeromagnetic survey in the Kasba Lake area (within Ennadai).

Targeted Geoscience Initiative

The Geological Survey of Canada (GSC) has committed $760 000 over two years to Northwest Territories petroleum projects under the TGI-2 program of the Targeted Geoscience Initiative. This will bring about $165 000 of additional funding to the Centre that will be matched through in-kind contributions. The GSC has also made a commitment to place a full-time scientist at the Centre.

Resource Assessments

The Centre has two staff members performing mineral and petroleum assessment work in support of land use decision-making, primarily in support of the Protected Areas Strategy (PAS). Summer fieldwork was undertaken this year in the Richardson Mountains (Gwich'in Land Use Plan), Edehzie (Horn Plateau PAS) and Sahyoue (PAS) areas.

The Centre completed a contract for the Deh Cho Land Use Planning Committee to assess the mineral and petroleum resource potential of the Deh Cho area. This will assist them in making informed land-use decisions. The petroleum volume has been released as a CS Lord Open File; the minerals volume is expected soon.

Outreach

Two Centre geologists led a field mapping and educational program in the community of Holman. Two community members were employed and many others, ranging from grade-school age to elders, participated in the two-week project.

A geology field school at the Wecho River field camp was co-sponsored by the Centre and the University of Alberta. Five students spent two weeks mapping under the leadership and direction of Centre and university staff.

The Centre was heavily engaged in planning and organizing the technical program for the annual Geoscience Forum held in November in Yellowknife.

2.13 NUNAVUT[22]

Land Tenure in Nunavut

In 1993 the largest Aboriginal land settlement in Canadian history was concluded through the *Nunavut Land Claims Agreement* (NLCA). The NLCA provided for the formation of the new territory of Nunavut on April 1, 1999, as well as providing many other rights to Inuit. Nunavut, which covers 1 994 000 km^2, comprises the eastern and northern portions of land previously referred to as the Keewatin and Franklin districts of the Northwest Territories. Nunavut's population approximates 27 000, 85% of which is of Inuit origin. A total of 27 communities are home to anywhere from 50 to 6000 people. Most communities offer a range of services (visit the Canada-Nunavut Community Business Service Centre web site [www.cbsc.org/nunavut], including regular scheduled air service. Several offer specific mining and exploration-related services and are home to independent prospectors and others experienced in mineral exploration and mining.

In addition to the creation of the new territory, the NLCA gave Inuit fee simple title to 356 000 km^2 of land. There are 944 parcels (16% of Nunavut) of Inuit Owned Lands (IOL) where Inuit hold surface title only (Surface IOL). The Crown retains the mineral rights to these lands. Inuit also hold fee simple title including mineral rights to the remaining 150 parcels of IOL (Subsurface IOL), which total 38 000 km^2 and represent approximately 2% of the territory. Surface title to all IOL is held in each region by one of the three Regional Inuit Associations (RIAs) while Inuit subsurface title with respect to Subsurface IOL is held and administered by Nunavut Tunngavik Incorporated (NTI). NTI issues rights to explore and mine through its own mineral tenure regime. Mineral rights (mineral claims or leases) that existed at the time of the signing of the NLCA–known as grandfathered rights–continue to be administered by Indian and Northern Affairs Canada (INAC) until they terminate or the holder transfers its interests to the NTI regime. For both Surface and Subsurface IOL, access to the land, through a Land Use Licence or Commercial Lease, must be obtained from the appropriate Regional Inuit Association.

The Crown owns mineral rights to 98% of Nunavut. INAC administers rights through the Canada Mining Regulations (CMR). This includes Surface IOL, for which access to the land must nevertheless be obtained from the RIA as explained above.

Significantly, the NLCA is a final settlement whereby all land claims in Nunavut have been settled with the Inuit of Nunavut, thus providing an unmatched level of land tenure certainty. However, land claims overlapping Hudson Bay and the southernmost Kivalliq are being negotiated with residents of northern Québec and northern Manitoba, respectively. The Government of Nunavut, INAC, NTI, the Canada-Nunavut Geoscience Office (C-NGO) and other pertinent government divisions and associations are working together to improve the Territory's geoscience knowledge base through regional mapping programs, thematic investigations, and geological compilation.

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[22] This overview is a combined effort of four partners: the Minerals & Petroleum Resources Section of the Government of Nunavut, the Mineral Resources Section of Indian and Northern Affairs Canada, the Lands and Resources Department of Nunavut Tunngavik Inc., and the Canada-Nunavut Geoscience Office. For more information, please contact Bernie MacIsaac by telephone at (867) 975-5914 or by e-mail at bmacisaac@gov.nu.ca.

Indian and Northern Affairs Canada: Nunavut Regional Office

INAC administers mineral tenure on Crown land in Nunavut. The Nunavut Regional Office, based in Iqaluit, has two work groups involved in regulating mineral tenure, the Mineral Resources Division and the Mining Recorder's Office, a part of the Land Administration Division.

The Mining Recorder's Office issued 190 prospecting permits in February, mostly on the Melville Peninsula. Others were issued for areas of Victoria Island and the mainland around Rankin Inlet and Wager Bay. As of mid-November, the Mining Recorder's Office had also received 1927 applications to record claims.

The Mineral Resources Division is involved in mineral tenure through the review of assessment reports filed under the Canada Mining Regulations (CMR), and through property visits to mines and exploration projects. This year, the division's district geologists visited 10 projects, primarily in the Kitikmeot and Qikiqtani regions.

The Archives has now scanned 808 of its 3734 assessment reports on an "as needed" basis.

Nunavut Tunngavik Incorporated

Nunavut Tunngavik Incorporated (NTI) is the Inuit corporation responsible for overseeing implementation of the NLCA. NTI's mandate includes safeguarding, administering and advancing the rights and benefits of the Inuit of Nunavut to promote their economic, social and cultural well-being through succeeding generations. The Lands and Resources Department of NTI is responsible for the implementation of Inuit responsibilities related to the management of Inuit Owned Lands (IOL), the environment, minerals, oil and gas, and marine areas.

There are two forms of mineral tenure that grant exclusive rights on Subsurface IOL administered by NTI. These are the Inuit Owned Lands Mineral Exploration Agreement (usually referred to as the "Exploration Agreement," or "EA") and the Inuit Owned Lands Mineral Production Lease (referred to as the "Production Lease"). The Exploration Agreement grants a company or individual the exclusive right to explore and prospect for minerals (excluding oil and gas, and Specified Substances such as construction materials and carving stone) on a portion of Subsurface IOL. This area, referred to as the Exploration Area, is similar in many ways to a mineral claim under the CMR. The Production Lease grants the holder of an Exploration Agreement the right to produce minerals from a portion of the Exploration Area known as the Production Lease Area.

Since 1999, NTI has had in place a system of application that does not require staking when applying for an Exploration Agreement. Rather, the application requires only a description of the Exploration Area based on latitude and longitude. The applicant must submit to NTI a completed application form, *Application for an Inuit Owned Lands Mineral Exploration Agreement* (available on request from NTI or from the Lands Department web site at www.polarnet.ca/ntilands/Exploration_App.htm). The completed application includes a description of the proposed Exploration Area defined by latitude and longitude of the boundaries as well as a map showing the proposed Exploration Area. Applications are received during designated months and are processed at the start of the subsequent month, at which time NTI will decide whether to accept an application and issue an Exploration Agreement. Applications are kept confidential until the close of the application period in which they are received, thus ensuring that all applicants are treated fairly. Further details on the application process are included in the application form.

Under the standard terms, successful applicants, upon executing the new Exploration Agreement and submitting the first year's annual fees, will be granted the exclusive right to explore for minerals on the Exploration Area. In order to gain access to the land, however, the applicant must obtain a surface right issued by the RIA.

NTI currently has 62 active Exploration Agreements with prospectors and exploration and mining companies. These cover more than 25% of the total subsurface IOL. (In addition, grandfathered claims and leases comprise approximately 2% of all subsurface IOL.)

The significant increase in the percentage of IOL under Exploration Agreements (up from 11% the previous year) was due to the signing of an Exploration Agreement with Strongbow Resources for most of the open land in the West Kitikmeot, totalling approximately 604 700 ha.

Government of Nunavut

The Government of Nunavut's Department of Sustainable Development (DSD) deals with issues related to Nunavut's minerals industry. DSD is committed to establishing a sustainable and vibrant minerals industry across the territory that contributes to the sustenance of healthy communities throughout Nunavut.

DSD focuses on community education and awareness, supports prospector development, and is committed to improving the geoscience database and upgrading transportation and human infrastructures. DSD is also committed to resource management, modernization of land use legislation and development of an exemplary mineral industry policy. DSD functions as liaison between industry and communities, local service sectors, educational institutions, work forces, and prospectors. These efforts will lead to improved investor confidence, which is already very strong.

Prospector Development - Nunavut Prospectors Program (NPP)

Initiated in 1999, the NPP provides financial and technical assistance to Nunavut prospectors. Several prospectors have made significant mineral discoveries over the past four years, culminating recently in three prospectors signing an option agreement for a property in the Baffin region. This year, 26 prospectors from across Nunavut received funding of up to $5000 through the program. A total of 12 NPP-supported prospectors hold mineral claims in Nunavut with interesting gold, platinum, base-metal and gemstone (sapphire and diamond) prospects.

Introductory Prospecting Course

A six-day Introductory Prospecting Course is delivered in communities throughout Nunavut every year. Since 2000, the courses have been offered in all communities in the territory with over 350 graduates to date. Popular with prospectors and individuals with a general interest in mineral exploration and mining, the course is an introduction to rock and mineral identification, map reading, sample collection and claim staking. The course is a stepping-stone for people who want to pursue prospecting as a career and/or hobby, building on the Inuit traditional knowledge of the land. Many people who take the course subsequently find employment with exploration companies active in their areas.

Canada–Nunavut Geoscience Office

The Canada-Nunavut Geoscience Office (C-NGO) is a partnership between the Government of Nunavut, the Geological Survey of Canada (GSC), and Indian and Northern Affairs Canada (INAC). The C-NGO management board consists of representatives of each of the partners as well as Nunavut Tunngavik Incorporated (NTI) and C-NGO.

During 2003, the C-NGO engaged in a number of thematic geoscience studies. Staff continued detailed field studies of Northern Baffin's Borden Basin, focusing on stratigraphic and structural constraints on zinc-lead-silver mineralization. Lastly, a new thematic project developed in conjunction with NTI was initiated in the Belcher Islands with the intent of updating the understanding of the stratigraphy and metallogeny of the Belcher Group.

The Arctic Zinc project, in collaboration with GSC-Calgary, completed the mapping and sampling component of its program, focused on the Cornwallis Zinc District in 2002. Geochemical and petrographic analyses on a regionally representative suite of sulphide minerals are nearly complete. New maps (1:50 000 scale) and regionally integrated structural interpretations of Little Cornwallis Island and part of western Cornwallis Island will be published in early 2004 (GSC Open File 1780).

At present, the C-NGO's North Baffin Quaternary project represents the only regional mapping program with active fieldwork in 2003. Within the study area (NTS map sheets 37E, 37F, 37G and 37H), Archean volcanic rocks of the Mary River Group are thought to have a high potential for gold, nickel, zinc and PGEs; the kimberlite potential of the area is also considered significant. The complex and poorly understood glacial history of the area means that an improved regional surficial geoscience knowledge base is a necessary prerequisite to effective mineral exploration in the region. This project is designed to evaluate the economic potential of northeastern Baffin Island by providing an improved understanding of the glacial history in this extensively drift-covered area.

In collaboration with INAC and the GSC, the C-NGO is planning to initiate a new regional bedrock mapping program in 2004. This project will focus on evaluating the economic potential of, and upgrading the geoscience knowledge base for, the Boothia Mainland area south of the community of Taloyoak and north of the Committee Bay Project (2000/2003). The core of the proposed study area contains crystalline rocks of Archean and possibly Paleoproterozoic age, which are presumably the continuation of comparable belts exposed in the Committee Bay area to the southeast. The only currently available bedrock maps for the region are at a small scale (1:500 000 and 1:250 000), and are considered inadequate for the facilitation of grass-roots mineral exploration. Moreover, appropriate complementary geoscience information is not presently available; the Boothia Mainland region remains a large data gap in the current understanding of the north-central Canadian Shield.

Summary of Mining and Exploration - 2003

On the mining front, the Lupin gold mine suspended operations in the summer as a strong Canadian dollar had an impact on revenues. It is not known whether owner Kinross Gold will re-open the mine, but the company has entered into agreements regarding its exploration projects in the Slave Province; Wolfden Resources has agreed to purchase the Ulu gold deposit, which is located south of the High Lake copper-zinc deposit. Miramar Mining now has an option to earn a 60% interest from Kinross in the George and Goose Lake gold project.

Meanwhile, mine reclamation continues at the Polaris and Nanisivik mine sites where operations were ended in 2002. Wolfden has purchased much of the Nanisivik mine infrastructure from Breakwater Resources and will be dismantling it for transport west towards High Lake.

As expected, Cumberland Resources has initiated the environmental assessment process for the Meadowbank gold project, north of Baker Lake. The Jericho diamond project and the Doris North gold project are undergoing separate environmental assessments led by the Nunavut Impact Review Board. A fourth environmental assessment of the Bathurst Inlet Port and Road project is also pending. The fact that three mines are now undergoing environmental assessment is very encouraging given the potential employment and revenues that could result.

Exploration expenditures are a significant part of the local economy as well, with around 20% remaining in Nunavut in the form of salaries, contracts and purchases. Industry's investment in 2003 is currently projected to be approximately \$82 million, up from the \$75 million invested in 2002 (NRCan, www.nrcan.gc.ca/mms/efab/mmsd/exploration/byprov2002.htm). This figure is a new high for the territory and is more than double the \$39 million spent in 1999. It also meant that Nunavut trailed only Ontario and Québec for exploration investment in Canada.

Approximately 22 million acres of tenure (mineral claims, prospecting permits and exploration agreements) were acquired by industry in 2002, an area larger than New Brunswick. Not surprisingly, 2003's figures are lower, although still strong; as of November 2003, the projected total for the year was 4.5 million acres of claims, 9.0 million acres of prospecting permits, and 1.5 million acres in exploration agreements. In total, mineral tenure held in various forms in Nunavut totals about 43 million acres, an area larger than New Brunswick, Nova Scotia, and Prince Edward Island, but only about 8% of Nunavut.

Drilling in 2003 was estimated at 123 000 m, with another 5000 m of RC drilling. This compares with 88 000 m in 2002 and 102 000 m in 2001. Much of the drilling took place on a small number of advanced projects: the Hope Bay (40 000 m) and Meadowbank (19 000 m) gold deposits, and the Ferguson Lake (21 000 m) and High Lake (15 000 m) base-metal deposits.

Diamond exploration continues to generate the most excitement in Nunavut. Stornoway and Northern Empire's 2002 discovery west of Igloolik proved to be a kimberlite, but the partners limited the flow of information to the public until after they secured several million acres of prospecting permits in February 2003.

Further south, around Rankin Inlet, kimberlite discoveries on three properties created a stir. Shear Minerals, Stornoway Diamonds, and BHP Billiton made the majority of the discoveries, finding 15 kimberlites on the Churchill diamond project.

Despite the spread of diamond exploration across the territory, gold bugs are holding their own. Miramar Mining encountered new areas of gold mineralization during a deep drilling program at the Boston deposit in the Hope Bay Belt, while Committee Bay Resources cut significant mineralization at the Three Bluffs Zone in the Committee Bay Belt. On Baffin Island, Commander Resources reported up to 6.87 oz/ton gold in chip and grab samples at the Malrok showing.

Base-metal exploration remains concentrated at a limited number of projects. Starfield Resources is continuing to develop its Ferguson Lake nickel-copper-platinum project. Anglo American Exploration has joined with Muskox Minerals in grass-roots exploration at the Muskox ultramafic intrusion; just a short distance away, Coronation Minerals and Guyana Goldfields drill-tested the DOT 47 copper occurrence. Wolfden Resources enjoyed a fruitful campaign at High Lake as separate gold and base-metal discoveries were reported.

Summary of Exploration Activities - 2003

Active Diamond Projects

JERICHO

Tahera Corporation conducted diamond drilling and till sampling on its 100%-owned Jericho project, located north of the Lupin gold mine. Tahera drilled a total of 690 m in order to test nine kimberlite targets. A single, steeply dipping kimberlite dyke was intersected approximately 9 km south of the Jericho kimberlite pipe. The dyke is believed to be between 0.6 m and 1.0 m wide and has a strike length of at least 20 m. Five diamonds were recovered from 7.6 kg of processed kimberlite. It also reported collecting approximately 450 till samples as part of its regional diamond exploration program.

Tahera provided an updated feasibility study for the proposed Jericho diamond mine. A total of 3.1 Mct are accounted for in the current eight-year mine plan, including open-pit mining of 2 Mt of kimberlite (2.4 Mct) followed by underground mining of 615 000 t (673 000 ct) of kimberlite.

Final public hearings related to the project's Environmental Impact Statement is planned for early December 2003. Tahera is hoping to have all regulatory and permitting completed by 2004 and construction and commissioning of the diamond plant by 2005.

VICTORIA ISLAND

At least 27 kimberlite dykes have been discovered on Victoria Island since the original discoveries were made by De Beers in the mid-1990s. Of these, approximately 20 dykes contain diamonds. Diamonds North Resources Ltd. currently operates several projects on the Nunavut portion of Victoria Island, including: the Blue Ice project (joint venture with Teck-Cominco Limited), the Wellington and Stefansson projects (joint venture with Majescor Resources Inc), and their wholly owned Hadley Bay project.

Kimberlites on the 450 000-acre Blue Ice property are hosted within the 20-km-wide northwest-trending Galaxy Structure. Diamonds North planned a $3 million program in 2003 that was designed to drill test the Galaxy Structure and collect large amounts of kimberlite for diamond analysis. An 11 360 line-km airborne geophysical survey was also flown over the property. Approximately 1850 m of drilling were completed and over 4 t of kimberlite was collected from 11 known occurrences. Only partial results were available as of mid-November 2003. A total of 78 diamonds (including 9 macrodiamonds) were recovered from 44.6 kg of the Vega kimberlite. Additionally, a 217.68-kg sample from the Snow Bunting dyke yielded a total of 88 diamonds, including 18 macrodiamonds. The SLT4 kimberlite dyke was also discovered in 2003 and yielded 44 diamonds, including 10 macrodiamonds from a 79.81-kg sample.

The 255 000-acre Hadley Bay property is located 20 km north of the Galaxy Structure. Known kimberlites at Hadley Bay are associated with the more than 25-km-long King Eider kimberlite trend. At least 10 kimberlites are known on the property. Diamonds North discovered a new kimberlite dyke in 2003 and also identified magnetic anomalies consistent with kimberlite pipes.

Stornoway Diamond Corporation also initiated diamond exploration on Victoria Island in 2003. They collected regional till samples on their prospecting permits totalling 945 000 acres. Results were not released by mid-November, 2003.

CORONATION GULF DISTRICT

The Coronation Gulf region is located in northwestern Nunavut (southeast of Kugluktuk) and covers approximately 3 million acres of land between Coronation Gulf and Napatulik Lake. The discovery of diamondiferous kimberlites by Ashton Mining of Canada and Kennecott Canada Exploration Inc. in late 2001 prompted a staking rush that resulted in over 2 million acres of land being acquired by various companies and joint ventures. Subsequent exploration has resulted in at least 15 kimberlite discoveries in the region.

The Coronation Gulf area straddles the exposed boundary between the easterly Archean Slave Province and the westerly Proterozoic Bear Province. Archean rocks are varied and comprise intrusive complexes and supracrustal belts. Proterozoic rocks of the Coronation Supergroup are mainly siliciclastic and carbonate rocks of the Recluse and Epworth Groups. Southeast-trending Mackenzie dykes (1.27 billion years old) are widespread in the region.

During May 2003, Northern Empire Minerals Ltd announced a merger with Stornoway Ventures Ltd. to form Stornoway Diamond Corporation. The move resulted in partial consolidation of diamond properties in the Coronation Gulf. Stornoway is currently the largest land owner in the Coronation region with interests in a total of 1.3 million acres. It is operator in 11 individual Coronation properties with various joint-venture partners including Navigator Exploration Corp. (Jewel and Bear properties), International Samuel Exploration Corp., Dasher Energy and Caltech Ventures (Sceptre and Tiara properties), and International Samuel Exploration Corp. and Earth Star Diamonds Inc. (Jubilee property). Stornoway also holds a 100% interest in the Aqua, Diva, Marquis, Princess, Crown and Orb properties. In 2002, six of these properties were surveyed with fixed-wing airborne magnetic surveys and four were surveyed by heli-borne magnetic and electromagnetic methods. A total of 3000 till samples were collected on all of the properties. In 2003, Stornoway spent nearly $3 million in the Coronation Gulf region and completed ground-truthing of airborne geophysical anomalies and also collected 2700 follow-up till samples.

Ashton Mining of Canada operates eight separate joint-venture projects in the Coronation Gulf region totalling approximately 776 000 acres. Ashton and Pure Gold Minerals Inc. are partners on the Ric, Kim, Vic, Eokuk and James River properties. The Kim property is host to the Artemisia and Thrift kimberlites and the Ric property contains the Perseus and newly discovered Caltha kimberlites. Ashton and Stornoway Diamond Corporation are partners on the Kikerk property, which hosts the Potentilla and Stellaria kimberlites. Finally, the BH and AW properties are partnered with Augusta Resources Corporation.

Ashton was active on all of these properties in 2003 and spent nearly $2 million on till sampling (approximately 1500 samples), diamond drilling (approximately 900 m) and ground geophysics. Drilling on the Ric property resulted in the discovery of the Caltha kimberlite. Caltha is located 14 km southeast of the Perseus kimberlite and 24 km northeast of the Anuri kimberlite and was discovered by drilling two holes in an electromagnetic anomaly measuring 160 m by 75 m. No diamonds were recovered through caustic dissolution. Drilling of four other electromagnetic targets on the Kim and Kikerk properties failed to intercept kimberlite.

Rhonda Corporation and its joint-venture partner Teck-Cominco Limited completed a 1156-m drill program (12 holes) on their 90 000-acre Inulik property in 2003. The Inulik property is located directly south of Ashton's Kim claims and directly east of Stornoway's Sceptre claims. Nine of the 12 holes intersected kimberlite. The most significant intersections were from holes IN-03-08 (24.4 m intersection) and IN-03-09 (10.0 m intersection). Seven kimberlite samples were submitted for microdiamond analysis; however, no diamonds were recovered.

Rhonda and partner De Beers Canada Exploration announced additional microdiamond data from their Knife kimberlite located on the Tree-1 claim (adjoining the Inulik property). A total of 567 stones were recovered from a total of 589.04 kg of kimberlite that was collected in five holes during 2001. A total of 11 stones with a bottom sieve size of 0.5 mm were recovered, including 5 stones with a bottom sieve size of 1.0 mm. In all, 1072.7 kg of kimberlite have been analyzed from the Knife pipe, yielding 718 stones for a total carat weight of 0.659304 ct.

Tahera Corporation also released an update on processing of a mini-bulk sample from the Anuri kimberlite located on the northern margin of Napatulik Lake. The Anuri pipe occurs on the 328 391-acre Rockinghorse joint venture that involves Tahera and Kennecott Canada Exploration Inc. The pipe was discovered by Kennecott in 2001 and comprises two distinct lobes that coalesce at depth. The surface dimensions of the pipe measure 325 x 575.4 m. In the spring of 2003, Kennecott drilled four holes into the kimberlite and recovered approximately 2.6 t of material for processing. As of mid-November 2003, some 1172.83 kg had been processed yielding a total of 352 diamonds. A total of 18 diamonds larger than 1 mm were recovered from the sample, including 2 diamonds greater than 1.70 mm.

MELVILLE PENINSULA (AVIAT PROJECT)

The Aviat project consists of several properties (Aviat North and South, Foxe, Tuktu, and Lyon) totalling approximately 7.0 million acres, located on the Melville Peninsula. Aviat North covers the north half of the Melville Peninsula and the Aviat South property lies 90 km south-southwest of Hall Beach. The property was originally staked and permitted by Hunter Exploration Group, who then entered into an agreement with Northern Empire Minerals. Northern Empire Minerals and Stornoway Ventures Ltd. merged to form Stornoway Diamond Corporation in May 2003 and BHP entered into a joint-venture agreement around that time.

This year Stornoway Diamond Corp. increased the size of the Aviat properties by the permitting and staking of 5.5 million acres, bringing the size of the property to approximately 7 million acres. The property was originally staked after finding the AV-1 kimberlite. The AV-1 kimberlite outcrops on a long narrow lake and comprises two phases. One phase is magnetic and diamondiferous and the other phase of the kimberlite body is non-magnetic. The diamond content of the second phase of kimberlite is yet to be determined. The entire AV-1 kimberlite has an overall dimension of 160 m long by 40-60 m wide. Two bulk samples taken from Aviat 1 have yielded 1614 diamonds from 1136 kg of kimberlite. The largest diamond recovered was greater than 2 mm in all dimensions.

A second outcropping kimberlite (AV-2) was found this field season 4 km from AV-1. Three holes were drilled into or near the AV-2 kimberlite. The first hole (inclined) encountered multiple intercepts of kimberlite. The second hole drilled 75 m away encountered two kimberlite intersections. No information was available for the third hole. Kimberlite material from the drill holes will be submitted for caustic fusion testing.

Work on the remainder of the property included approximately 50 000 line-km of airborne magnetic survey, 1800 line-km of Dighem survey, 1100 m of diamond drilling on AV-1 and AV-2, and the collection of 2600 till sample as part of a regional sampling campaign and to follow up previous anomalies.

MELVILLE PENINSULA AND BAFFIN ISLAND (SCARPA, GEM AND FURY PROPERTIES)

Navigator Exploration Corp. in conjunction with NDT Ventures Ltd. collected a total of 245 till and stream sediment samples from the three properties on the Melville Peninsula and Baffin Island. The three properties combine to total approximately 1 000 000 acres. Navigator also flew 14 700 line-km of high-resolution aeromagnetic data. Ground-truthing the initial results of the airborne geophysics has led to identification of a large sulphide-bearing iron formation that was sampled for assay. Results are pending.

BAFFIN ISLAND

The De Beers Canada Exploration Inc. Baffin Island project consists of 131 prospecting permits covering 8 043 661 acres around Steensby Inlet on northern Baffin Island. The property is underlain by Paleozoic carbonates that overlie Archean granitoids and gneisses.

De Beers Canada Exploration Inc.'s 2002 program consisted primarily of reconnaissance and follow-up till sampling and surficial mapping. A 24-person camp was established and a total of 4915 till and stream sediment samples were collected on the property.

In 2003, De Beers Canada Exploration conducted ground geophysics on targets delineated through airborne geophysics and drilled eight reverse circulation holes. Other activities included the collection of regional and in-fill till samples and prospecting for kimberlite float. A sample of kimberlite was collected in order to determine diamond content using caustic fusion.

BRODEUR PENINSULA (JACKSON INLET)

Twin Mining Corporation's Jackson Inlet property covers 537 mining claims (5107 km^2 or 1 262 079 acres). Twin mining increased its land position by 436 mining claims (2283 km^2 or 564 234 acres) on the Brodeur Peninsula of Baffin Island in 2003. Three outcrops of kimberlite were known to occur on the claim block prior to Twin's acquisition of the claims. The area is underlain primarily by Cambrian and Ordovician sediments and Silurian limestones that, in turn, overlie Archean crust of the Rae craton.

Twin Mining Corporation acquired the property from privately held Helix Resources in June 2000. A prospecting program in May 2000 had collected a 94.5-kg sample from a previously known (but unspecified) kimberlite and was found to contain 40 microdiamonds and two macrodiamonds. Further prospecting and magnetic surveying began in the summer. Over a dozen new kimberlite occurrences were reported, four of which were trenched. Sample results included 0.196 ct from

887 kg of fresh and weathered kimberlite from Pipe 1. Pipe 2 yielded 1.049 ct from 560 kg of material while 195 kg from Pipe 3 contained 0.156 ct.

Work on the Jackson Inlet property this year included the collection of 426 till and stream sediment samples from the newly staked property. Along with till sampling on newly acquired ground, Twin Mining Corporation performed a high-sensitivity gradiometer magnetometer survey over the Cargo 2 kimberlite and discovered eight anomalies in two corridors separated by 1.2 km. The corridors of anomalies are parallel to the Freightrain/Cargo 1 trend.

This season, kimberlite fragments were found in a corridor (up to 50 m wide) between the Freightrain and Cargo 1 kimberlites and 700 m past Cargo 1. The fragments are weathered but show no sign of transport other than frost action. Three samples were collected totalling 50.5 kg of kimberlite float. All three samples contained diamonds; 13 were recovered in total. Diamond-indicator minerals were collected from the float. Analysis shows that the kimberlite originated within the diamond stability field with a geothermal gradient of 35-40 mW/m^2. Mantle ilmenites indicated that the diamonds will be highly preserved, if present.

BRODEUR PENINSULA (OZ SERIES CLAIMS AND PROSPECTING PERMITS)

The Kennecott claims are found in seven blocks located east-southeast to north-northwest of Nanisivik on the Brodeur Peninsula. Some of the blocks are adjacent to Twin Mining's ground. VEC Consulting, as Lumina Resources, discovered the "Zulu" kimberlite in 1994. Twin Mining later renamed this discovery the Freightrain after acquiring the Freightrain and Slot claims from Fred Tartanic. They then began exploration work in March 2000. At that time Kennecott was in negotiations with VEC to acquire exploration results and prospecting permits held by VEC since January 2000. Kennecott applied for, and received, an additional eight prospecting permits distributed throughout the peninsula.

Kennecott Canada Exploration was active once again on its Brodeur Peninsula properties (Oz claims and prospecting permits). Kennecott Canada Exploration collected till and stream sediment samples, performed diamond drilling, and conducted ground magnetic surveys. Kennecott also increased its land position on the Brodeur Peninsula during the last season. At the time of writing, there were no results to report.

REPULSE BAY RECONNAISSANCE

BHP-Billiton continued diamond exploration on its Repulse Bay property. The property consists of some 405 claims.

RANKIN INLET DISTRICT (CHURCHILL/TRUSTME PROPERTY)

The Churchill diamond project comprises approximately 1.7 million acres and spans an area about 15 km north of Rankin Inlet northwards to Chesterfield Inlet. The property is owned by Shear Minerals Ltd. (51%), Stornoway Diamond Corp. (35%), and BHP Billiton (14%).

Diamond exploration remained limited in this area until Shear Minerals began to explore for diamonds in 2001 with the collection and kimberlite mineral analysis of 64 till samples. Encouraging results led to further till sampling and a detailed airborne geophysical survey (16 000 line-km) in 2002. Identification of 29 high-priority geophysical targets for drilling and the discovery of kimberlite float in 2002 triggered further interest in the project. The project was expanded to cover approximately one million acres with an exploration budget of $2.5 million announced for 2003. Additional land acquisition in May 2003 brought the size of the property to more than 1.5 million acres.

Results in 2003 include additional aeromagnetic surveys (8000 line-km on Churchill and 14 000 line-km on Churchill West, all at 150-m spacing), the collection of 1500 till samples, identification of 325 geophysical anomalies, and ground geophysical surveys on 30 anomalies. Also significant is the impressive mineral chemistry, which includes a high proportion of G10 garnets. Drilling of priority targets commenced in June and the first kimberlite, called Qaumallak (Inuktitut for Lightning), was intersected shortly thereafter.

Although only 15 targets were initially selected for drilling in 2003, the excellent success rate motivated further drilling. Of the 26 anomalies drilled to date, 16 are kimberlites located on the Churchill property and 2 are kimberlites on Churchill West. Both magnetic highs and lows have proven to be kimberlites and all are considered to be pipe-like bodies at this point. Some drill holes show two facies of kimberlite that commonly contains mantle xenoliths and visible indicator minerals such as pyrope, ilmenite, chromite, olivine and phlogopite.

Active Gold Projects

HOPE BAY PROJECT - MIRAMAR MINING CORPORATION

Miramar Mining Corporation controls most of the Hope Bay greenstone belt (approximately 250 000 acres), large portions of which are Inuit-owned ground administered by Nunavut Tunngavik Incorporated. The Hope Bay belt is located in the northeast corner of the Archean Slave Province. It extends north-south for some 80 km and is 7-15 km wide.

Significant discoveries of gold mineralization have been made in the Hope Bay volcanic belt since the early 1990s, with important occurrences including the Boston, Doris and Madrid group of deposits. Prior to 2003, over 200 000 m of diamond drilling had been completed in the belt by Miramar and previous owners BHP-Billiton Ltd. A total measured and indicated resource of 1.6 million oz of 15.7 g/t gold and an additional 2.7 million oz of 12.3 g/t gold are known in the belt (calculated prior to 2003 results).

Exploration during 2003 comprised 40 000 m of diamond drilling (87 holes), 4300 m of reverse circulation drilling (248 holes), geological mapping, prospecting, and ground magnetics totalling over $15 million. Approximately 30 000 m of diamond drilling was completed on the Madrid deposits located in the northern part of the belt. A number of deposits, including Suluk, Perrin, Rand Spur and Naartok, are known over at least an 8-km strike length. Drilling at Suluk expanded the mineralization to a strike length of over 500 m and to a depth of 500 m. Highlights include hole PMD227, which intersected 23.1 m (true width) at an average grade of 11.9 g/t gold, which included a higher-grade intercept of 15.9 m grading 16.4 g/t gold.

Deep drilling at the Boston deposit located in the southern part of the belt extended the known gold zones to a depth of over 1400 m and a strike of 750 m. Boston is the largest gold resource in the belt and comprises at least three sub-parallel zones (B2, B3, B4) characterized by quartz-carbonate veining and extensive iron-carbonate and sericite alteration. Hole S03-293 returned an exceptional intercept of 54.7 g/t gold over 9.0 m. Also, hole S03-295 returned 2.9 g/t over 10.9 m between 635 and 647 m.

Miramar also submitted a draft Environmental Impact Statement to the required regulators for development of the proposed Doris North gold deposit. An updated resource calculation for the Doris North area is 458 200 t grading 22.0 g/t gold yielding a total indicated and inferred resource of 323 900 oz of gold. The Doris deposits are located several kilometres from tide water and mineralization is associated with high-grade visible gold hosted in folded, fault-fill quartz vein systems. Preliminary scoping studies are also under way in the Doris area in efforts to expand known resources.

MEADOWBANK - CUMBERLAND RESOURCES

The Meadowbank gold deposits occur within the Archean Woodburn Lake greenstone belt, approximately 75 km north of Baker Lake, and represent the third largest undeveloped gold resource in Canada.

Six gold deposits have been identified on the property: Goose Island, Third Portage, North Portage, Vault, Bay Zone and PDF. The Connector Zone, discovered in 2002, is a near-surface high-grade zone linking the Third and North Portage deposits. Highlights of the $6.5 million 2002 program included expansion of the Vault deposit, completion of environmental baseline studies, and some encouraging results from the PDF zone.

The majority of 2003 work focused on in-fill and expansion drilling of the known deposits in order to increase confidence in the resources for feasibility studies. Phase 1 of the two-part 2003 program included 14 000 m of diamond drilling in 148 holes, as well as feasibility studies and commencement of the permitting process. Results of Phase 1 drilling led to a resource increase from 7 775 000 t grading 5.79 g/t gold (measured and indicated) and 10 937 000 t grading 4.44 g/t gold (inferred) to 15 Mt grading 4.66 g/t gold (measured and indicated) and 8.9 Mt grading 4.2 g/t gold (inferred), for a total resource estimated at 3.5 million oz of gold (compared to a resource of 200 000 oz in 1995). Phase 1 drilling focused on improved definition on the near-surface portions of the Goose Island and Vault deposits in preparation for final feasibility open-pit designs.

Phase 2 activities included an additional 5000 m of drilling (both in-fill and exploration). Preliminary assessment of a 10-year open-pit mining plan (January 2002) indicated that Meadowbank could support a production rate of about 250 000 oz/y at an approximate cash cost of US$168/oz for over eight years. Feasibility studies are expected to wrap up by year-end. The company also conducted further exploration work (mapping and some drilling) along the Meadowbank Trend, north of the Vault deposit, to delineate targets for the 2004 season. Cumberland is planning an aggressive exploration program at Meadowbank for 2004.

MELIADINE - COMAPLEX MINERALS CORP.

WMC Resources Ltd. accepted an offer to merge its Canadian operating subsidiary, WMC International Ltd., with the Canadian junior mining company, Comaplex Minerals Corp., in July 2003. Comaplex is now the operator of the project and its ownership in the Meliadine West gold project has increased from 22% to 78%. Cumberland Resources owns the other 22%. To date, over $60 million has been spent on the project since 1995.

Results for the 2003 program include 5476 m drilled in 19 holes in the Tiriganiaq zone and yielded up to 33.7 g/t gold over 10.8 m. This drilling was designed to move "inferred" resources to the "indicated" status. Three additional regional targets were also assessed through geological mapping, ground geophysics and sampling. These are the Nanuk/Peregrine shear zone (assays up to 256 g/t), the Raptor Zone (up to 125 g/t), and the SikSik East Zone (up to 47.25 g/t). The Meliadine West property hosts an inferred resource of 4.5 million oz of gold in four separate zones. To date, over 125 km have been drilled on the Meliadine West property and Comaplex is now considering the resource in the context of a high-grade underground operation.

The Meliadine East property is 50-50 co-owned by Comaplex Minerals and Cumberland Resources. An inferred resource of approximately 300 000 oz of gold was calculated for the Meliadine East property in 1996. Although no gold exploration has been conducted on Meliadine East in the past two years, till samples were collected for kimberlite indicator mineral analysis over the northern half of the property in 2001. Positive results led to completion of a detailed (40-m line spacing) aeromagnetic survey in the fall of 2002. Results in 2003 include a 1650-m diamond drill program. Of the 16 holes drilled, 14 intersected kimberlite; 10 of these represent separate kimberlite bodies. Only one of the ten kimberlites was diamondiferous. Results of additional petrographic and mineral indicator studies are pending.

COMMITTEE BAY - COMMITTEE BAY RESOURCES

The Committee Bay greenstone belt is one of the largest unexplored greenstone belts in North America, and Committee Bay Resources (CBR) currently holds approximately 500 000 acres along the 300-km-long greenstone belt. CBR has entered into an agreement with Gold Fields Exploration whereupon the latter can earn a 55% interest in CBR's Committee Bay property by spending $7.5 million over four years while CBR remains the operator.

Exploration in 2003 included 14 000 line-km of 200-m-spaced geophysics, 85 300 line-km of 400-m-spaced geophysics, and 1477 m of drilling on three targets (14 holes), as well as geological mapping and the collection of 500 grab samples to delineate new gold targets. In addition, till sampling for kimberlite indicator mineral analysis was also conducted and CBR has retained the right to explore for and exploit any diamond deposits on the property, subject to a 1% royalty payable to Gold Fields upon the sale of any diamonds.

Drilling in 2003 identified a new high-grade gold discovery that is open along strike and at depth. Encouraging drill results were yielded at the Three Bluffs, Inuk and Koffy occurrences. At Three Bluffs, gold occurs in intercalated iron formation, mafic volcanic rocks and sedimentary rocks, and visible gold is identified where quartz veining is most intense. Mineralization there is spatially associated with the Walker Lake Shear Zone. Gold mineralization is delineated by drilling over 700 m along strike, to a depth of 50 m, and remains open. Gold values of up to 27.41 g/t over 9.44 m and 61.60 g/t over 4.84 m are reported for Three Bluffs. CBR also reports that low-grade (3 g/t gold) halos of 15-20 m in thickness are associated with many of the high-grade zones. CBR intends to continue aggressive exploration in 2004.

NOOMUT RIVER - COMAPLEX

In March 2002, Placer Dome (CLA) Limited signed an agreement with Comaplex whereby Placer has an option to earn up to a 75% working interest in the Noomut property by spending $8 million over a five-year period.

During the 2002 field season, Placer funded a $1.1 million exploration program on the Noomut property. The program, executed by Comaplex under a management contract with Placer Dome, consisted of surface mapping and geochemistry, approximately 60 line-km of IP surveying, and follow-up diamond drilling in the fall. A total of 2250 m in 14 holes was drilled in the Esker zone and on targets in the Yandle area. Drill results of 13.1 g/t gold over 2.5 m were recovered in a previously untested area on the property.

In 2003, $750 000 of new exploration work was completed by Comaplex under the agreement with Placer Dome. The program included ground geophysics (IP, magnetics), diamond drilling (12 holes totalling 1760 m) and the collection of 400 soil samples. Results are pending.

TK CLAIMS - CORONATION MINERALS INC.

Coronation Minerals Inc. and its partner Guyana Goldfields Inc. have been exploring the copper potential of the 112 500-acre TK claims located in the Dismal Lakes area, 75 km southwest of Kugluktuk. Exploration in the 1960s resulted in the discovery of a number of copper showings in the area. They are typically associated with native copper and chalcocite and bornite mineralization occurring as fracture fillings in flow top brecciated basalt. Coronation Minerals recently completed a 7186-m diamond drill program (7 holes) designed to extend the previously known "Dot 47" occurrence as well as test a nearby 10 milligal gravity anomaly. Results from two holes in the Dot 47 area have thus far been released. Hole 2003-47-1 intersected hematitic and brecciated basalt over a 185-foot interval and graded 1.48% copper over that length. Additionally, hole 2003-47-2 intersected 238.75 feet grading 1.63% copper. Additional drill results are pending.

Active Base-Metal Projects

HIGH LAKE - WOLFDEN RESOURCES INC.

Significant new discoveries were made during 2003 at Wolfden Resources Inc.'s High Lake copper-gold-silver-zinc property. Wolfden has a strategic arrangement with Teck-Cominco Limited whereby Teck-Cominco provides technical and financial support to the project in exchange for first right of refusal on the property.

Numerous known gossans host copper-zinc-gold-silver mineralization, including the A-B and D zones. The former consists of stringers and massive lenses of chalcopyrite, pyrite, pyrrhotite, sphalerite and magnetite while the latter consists primarily of sphalerite, pyrite and minor chalcopyrite.

Drilling during 2003 resulted in the discovery of the overburden-covered West Zone, located several kilometres west of previously known mineralization. The zone has a strike length of at least 400 m and has been tested to a depth of 425 m. The style of mineralization is similar to known deposits and consists of massive sulphides hosted at significant stratigraphic breaks. Drill results thus far released include an interval of 68.5 m grading 3.96% copper, 3.73% zinc, 142.3 g/t silver and 3.4 g/t gold. This intersection includes a narrow and higher-grade interval of 8.85 m at 5.49% copper, 3.09% zinc, 190 g/t silver and 5.1 g/t gold. Drilling also resulted in the discovery of a new gold-rich zone located approximately 200 m from the known A-B and D zones. Mineralization is comprised of strong quartz flooding accompanied by disseminated pyrite, sphalerite, chalcopyrite and visible gold. The discovery hole returned 5.0 m grading 11.9 g/t gold and 66.7 g/t silver, which included a higher-grade interval of 3.0 m grading 17.8 g/t gold.

Late in 2003, Wolfden also announced it has agreed to terms with Kinross Gold Corporation to acquire a 100% interest in the Ulu gold deposit, located approximately 50 km south of High Lake. Ulu was discovered in the late 1980s and has a drill-indicated resource of 1.5 Mt grading 12.78 g/t gold. Terms of the agreement were not released and approval is subject to a due diligence review as well as regulatory and third-party review.

FERGUSON LAKE - STARFIELD RESOURCES

The 57 000-acre Ferguson Lake project is wholly owned by Starfield Resources. The company expanded its interest in the property through negotiations with Wyn Developments whereby the former can earn a 50% interest the latter's land adjacent to the Ferguson Lake claims.

The Ferguson Lake deposit is a nickel-copper-PGE deposit hosted by medium to weakly foliated tholeiitic gabbro-hornblendite layered intrusions. The gabbro hosting the copper-nickel-PGE massive sulphides is exposed 1.8 km along strike on the West Zone and is covered by deformed tonalite farther west. Three-dimensional inversion magnetic mapping indicates that the Ferguson Lake gabbro extends for at least 16.6 km to the west and is shallowly buried and well-rooted to depths of at least 800 m.

Massive sulphides of the West Zone have been drill-intercepted over 2.8 km at depths coincident with the interpreted continuous electromagnetic (EM) conductor. The sulphides include pyrrhotite, chalcopyrite, pentlandite-violarite, pyrite and magnetite. PGMs associated with the massive sulphides include kotulskite, teeuropalladinite, moncheite and sperrylite.

Further west, the relatively newly discovered 119 Zone is characterized by increased nickel-copper-PGE grades in two to three massive sulphide units that dip 20 degrees to the north over a drilled strike distance of 400 m. Another relatively new discovery is the low-sulphide gabbro containing PGE mineralization (LS-PGE), which occurs in the footwall to the massive sulphides. The LS-PGE gabbro is characterized by dispersed biotite alteration and fine-grained disseminated pyrite. Some intercepts contain platinum plus palladium grading up to over 1 oz/t. The LS-PGE reacts well to crushing and dense media separation with high-grade PGEs yielded from the sink concentrate and flotation cell recovery products. The widest zone (19 m wide with a grade of 3.65 g/t platinum plus palladium) is found to track the massive sulphide unit some 30-50 m below its base and has been traced for 160 m along strike in the West Zone potential "pit area."

MUSKOX PROJECT - MUSKOX MINERALS CORPORATION

Since the mid-1990s, Muskox Minerals Corporation has been exploring an extensive land package (Crown and IOL parcels) that covers the majority of the exposed Muskox Intrusion. The 1.27 billion-years-old Muskox Intrusion is a classic example of a layered mafic/ultramafic complex. The intrusion has a funnel-like shape that is up to 11 km wide and is exposed for 125 km in a north-south direction. Geophysical data suggest the intrusion continues for another 250 km under cover rocks. The intrusion consists of four main units: the Feeder, or Keel, Dyke; the Marginal Zone; the Layered Series; and the Roof (or Upper Border) Zone. Several other companies have explored the Muskox for its nickel-copper-PGE potential since the 1950s, including Inco, Equinox, Platinova and Trilogy Metals Inc.

During 2003, Muskox and its partner Anglo American Exploration Ltd. conducted an airborne spectrum geophysical survey that identified 21 conductive targets that were followed up by later ground surveys. A subsequent drill program of approximately 1500 m began in mid-August in order to drill test some of these conductors. Results from the first seven holes were available by mid-November. Anomalous metals were encountered in two holes: MX03-01 and MX03-02. Of note are results from MX03-01, which included a 0.61-m interval grading 1.22% nickel, 0.76% copper, 0.03% cobalt, 340 ppb platinum and 1150 ppb palladium. These results are from footwall paragneiss below the basal contact of the intrusion and are associated with low total sulphide content (less than 6% sulphur).

WEST KITIKMEOT/NTI JOINT VENTURE - STRONGBOW RESOURCES INC.

Strongbow Resources Inc. has signed a memorandum of understanding with Nunavut Tunngavik Inc. (NTI) that gives Strongbow exclusive rights to explore for and mine minerals on some 605 000 ha of Inuit Owned Land. A total of 28 individual land parcels in the West Kitikmeot region are subject to the agreement. The geology of the parcels is very diverse. Some parcels cover portions of greenstone belts such as the High Lake, Hackett River and Hope Bay belts, whereas other parcels cover Proterozoic rocks of the Wopmay Orogen. Target commodities are diamonds, gold and base metals.

To date, Strongbow has spent approximately $1 million on the project. Work completed in 2003 included a 22 000 line-km airborne magnetic survey as well as 1:10 000 scale mapping over parcels CO-69 and CO-20. Nine previously known showings were ground-truthed and approximately 250 till samples were collected. As part of the agreement, Strongbow also completed a data compilation of previous exploration and geoscience information on all 28 parcels.

3. Canadian Exploration Activity Around the World

3.1 INTRODUCTION

This section provides an overview of Canadian mineral exploration[23] activity abroad. It also highlights the domestic and foreign components of the larger-company exploration market in Canada. The information in this review[24] was current as at August 2003.

3.2 GLOBAL MARKET FOR MINERAL EXPLORATION

In 2002, the value of exploration programs planned around the world by companies of all sizes for precious metals, base metals and diamonds stood at an estimated $3.0 billion (US$1.9 billion), down by more than 12% from the $3.4 billion (US$2.2 billion) planned the previous year.[25] Compared with 2001, the value of exploration programs planned worldwide for 2002 was lower in roughly two thirds of countries where companies operate. Only in Russia, Mongolia and Finland was there an increase in exploration programs of more than $10 million expected from 2001 to 2002. In contrast, there were seven countries where year-over-year decreases in programs of $30 million or more were expected to occur; in three of these countries, decreases of $50 million or more were likely.

3.3 WORLD'S LARGER COMPANIES

Global trends in mineral exploration are based on data for the world's larger mining companies. These companies are defined here as those with annual exploration budgets of more than $4.7 million in 2002 (current US$3 million annually). The larger companies are the only ones for which there are consistent data on worldwide exploration activities spanning a period of 11 years. In 2002, 96 companies based around the world each planned to spend more than $4.7 million on exploration. In 2001, 98 companies had planned to spend an equivalent amount; in 1997, the number stood at a record 279.

During 2002, the world's larger companies were expected to undertake exploration programs with a combined value of $2.1 billion (US$1.4 billion) in 94 countries, 5 countries fewer than in 2001.

The world's larger companies represent only about 15% of the 724 companies of all sizes that were expected to be active in mineral exploration worldwide during 2002. However, these companies account for roughly 80% of the value of all mineral exploration programs carried out around the globe.

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[23] Most of the statistical data on the larger-company mineral exploration market are based on *Corporate Exploration Strategies: A Worldwide Analysis*, published annually by Metals Economics Group, Halifax, Nova Scotia. MEG counts, as exploration, work from the earliest stage through perimeter drilling, reconnaissance and evaluative forays, as well as work to further quantify and define an identified orebody once the target outline stage has been completed. It also counts as exploration all feasibility work up to the point of a production decision. The information on specific projects is based on company reports.

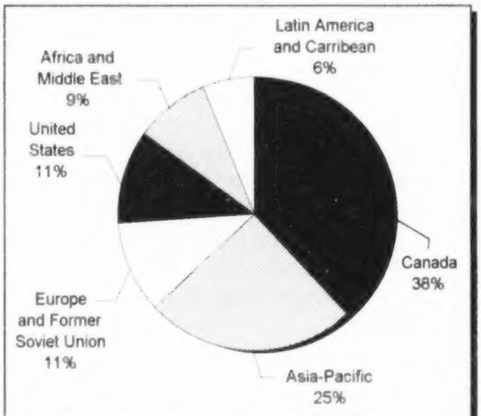
[24] Chapter 3 of this report is a summary of an article from the 2002 *Canadian Minerals Yearbook* published by Natural Resources Canada (available on the Internet at www.nrcan.gc.ca/mms/cmy/2002/CMY_e.htm).

[25] All currencies in this review are expressed in Canadian dollars unless indicated otherwise.

On a commodity basis, the larger companies account for over 80% of the value of programs aimed at base metals and diamonds, for more than 75% of those aimed at gold, and for almost 70% of those aimed at platinum group metals (PGMs). On a regional basis, the larger companies account for over 85% of the programs planned for Europe and the former Soviet Union (FSU), and for Latin America; 80% or more of those planned for Africa and the Middle East, and for the United States; and roughly 70% of those planned for Asia-Pacific and for Canada.

3.4 LARGER CANADIAN-BASED COMPANIES

Figure 37
Distribution of the World's Larger Exploration Companies, by Domicile, 2002



Based on 96 companies with budgets of at least $4.7 million (US$3 million) for precious-metal, base-metal or diamond exploration

Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

There are more mineral exploration companies based in Canada than in any other country (**Figure 37**). In spite of generally low prices for mineral commodities in recent years and the difficulty for many companies that have no producing mines to raise capital, 37 Canadian-based companies each planned to spend $4.7 million or more on mineral exploration in 2002, up from 32 in 2001.

In 1996, mining companies listed on Canadian stock exchanges raised a record amount of equity capital.[26] As a result, 141 Canadian-based companies had each planned to spend, in 1997, the equivalent of $4.7 million on mineral exploration programs around the world. That year their aggregate budgets for exploration, adjusted for inflation, reached a record value of almost $2.1 billion.

In 2002, the total value of the exploration programs that the larger Canadian-based companies planned to undertake in Canada and elsewhere around the world stood at $670 million (**Figure 38**), or down by 12% from almost $760 million budgeted in 2001. About two thirds of the decrease in these Canadian exploration budgets from 2001 to 2002 was expected to occur abroad.

The programs that the larger Canadian-based companies planned to undertake during 2002 represent 32% of all larger-company exploration programs for the entire world. These Canadian companies account for the dominant share, by far, of all worldwide mineral exploration activity.

Companies based in Africa account for 17% of the larger-company activity worldwide, while companies based in Europe and those based in Australia each account for 16%. In 1997, the exploration programs of the larger Canadian-based companies accounted for a record 35% of the value of all mineral exploration activity planned worldwide.

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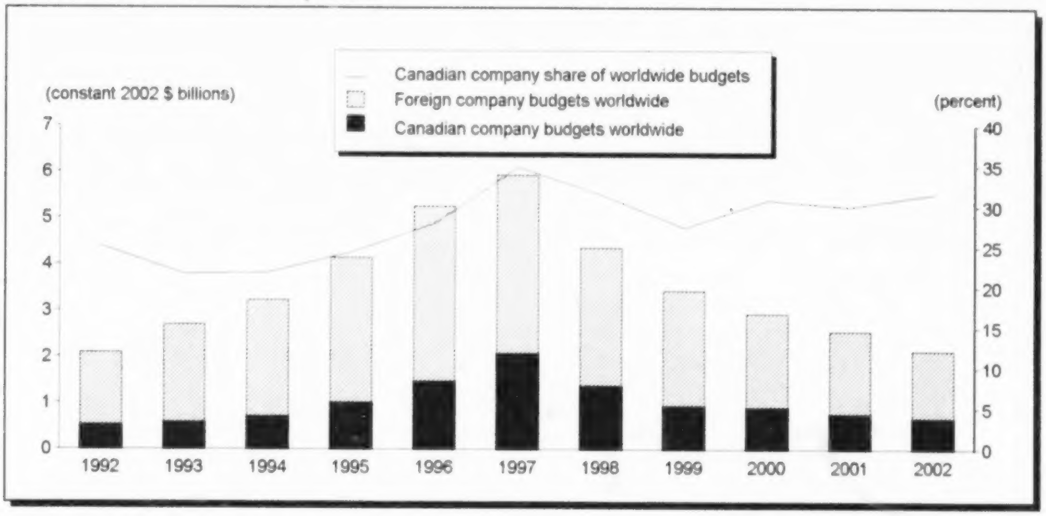
[26] Keith Brewer and André Lemieux, *Canada's Global Position in Mining - Canadian Financing of the International Mining Industry*, Metals Finance 4th International Conference, Toronto, May 7-9, 1997, Natural Resources Canada, Ottawa, 53 pp.

Figure 38
Exploration Budgets of the World's Larger Companies, by Origin, 1992-2002
Companies with Worldwide Budgets of at Least $4.7 Million in 2002 for Precious-Metal, Base-Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
Notes: The worldwide exploration budgets of companies that intended to spend less than 4.7 million (US$3 million) in 2002 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

The larger Canadian-based companies typically budget less individually for exploration programs than the industry average worldwide. In 2002, the exploration budgets of the larger Canadian-based companies had a mean of $18.2 million and a median of $7.5 million compared with global averages of $22.2 million and $9.1 million, respectively. In 2002, the mean of the budgets of the larger Canadian-based companies decreased by more than $5 million compared with that of the previous year.

Although, on a company-by-company basis, there can be a significant variation between budgets and expenditures, aggregate exploration budgets generally provide a reliable estimate of the total amount actually spent in the field worldwide. In the case of the larger Canadian-based companies, actual expenditures in 1999 were about 7% lower than budgeted, roughly the same departure as observed in the previous year.[27]

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of more than 6100 mineral properties (**Figure 39**) located in Canada or in more than 100 other countries around the world.[28] Most of this portfolio consists of properties at the early stages

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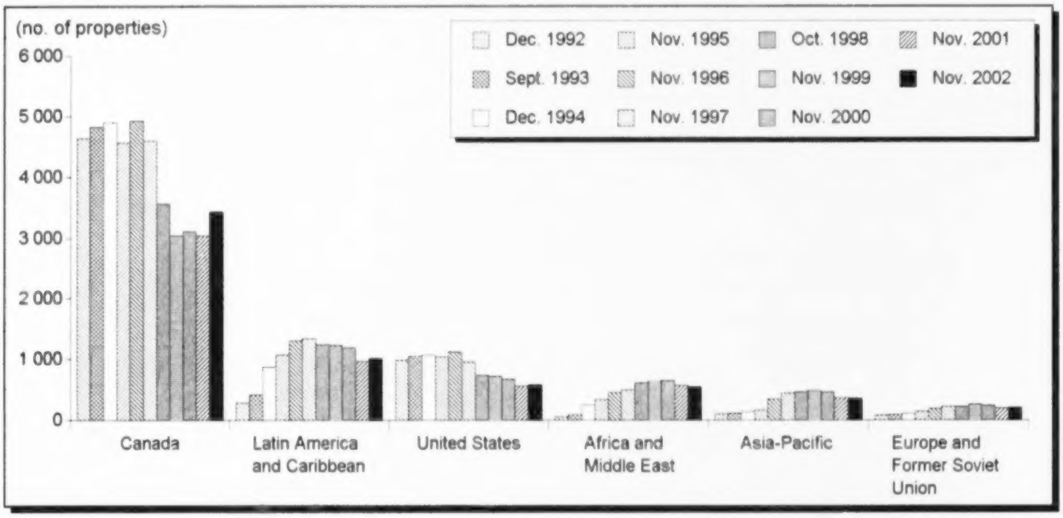
[27] For more information on various aspects of the relationship between exploration budgets and exploration expenditures for the larger Canadian-based companies, see André Lemieux, "Canada's Global Mining Presence," in the 1998 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.1 and 7.2 (www.nrcan.gc.ca/mms/cmy/content/1998/08.pdf). See also André Lemieux, "Canada's Global Mining Presence," in the 1999 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.1 and 7.3 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

[28] Most of the data for 1991 through 1997 on the mineral property portfolio of companies of all sizes listed on Canadian stock exchanges are derived from MIN-MET CANADA; for 1998 through 2002, they are derived from InfoMine db. These databases are products of Robertson Info-Data Inc. of Vancouver, British Columbia.

Figure 39
Canadian Mineral Property Portfolio Worldwide, by Region, 1992-2002
Companies of All Sizes Listed on Canadian Stock Exchanges



Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1992-97 and InfoMine db for 1998-2002, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.
Note: The decrease in properties in Canada after 1997 is due, in part, to the implementation of database features that make it possible to exclude many inactive properties.

of exploration. The number of properties held worldwide at the end of 2002 increased by about 400, or by more than 7%, compared with the number held at the end of the previous year. This increase occurred mainly in Canada and reflects, in part, the increasing recognition by the mining industry of the diamond and PGM potential in this country.

3.5 LARGER-COMPANY EXPLORATION MARKET IN CANADA

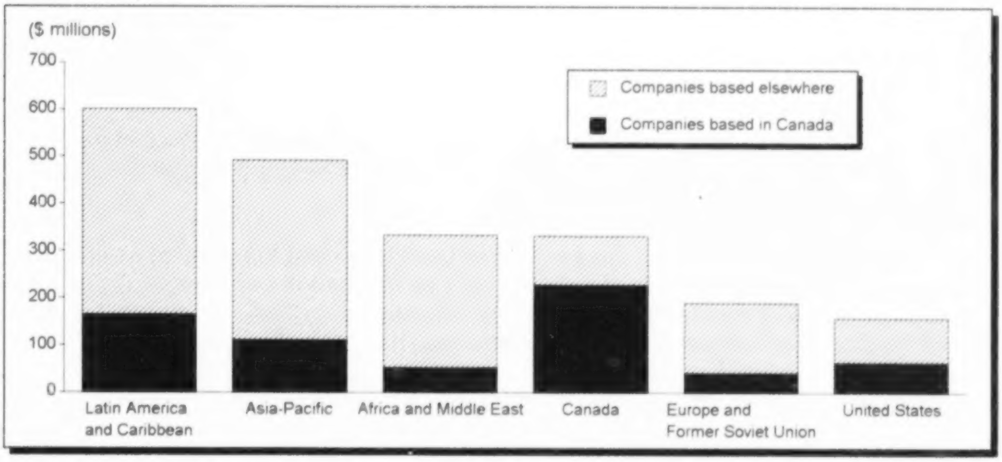
In 2002, the larger-company mineral exploration market in Canada was valued at $330 million, down by $35 million, or 10%, from roughly $365 million in 2001 (**Figure 40**). Only in Australia and the United States were aggregate exploration programs expected to experience larger year-over-year reductions. For the first time in a decade, Canada, in 2002, became the country where the global mineral exploration industry is the most active. Australia held that position from 1992 through 2001. The smaller companies are important contributors to mineral development in Canada and elsewhere around the world, but their activities are not addressed specifically here.

In 2002, 42 of the world's larger domestic-based or foreign-based companies planned to explore for minerals in Canada, up from 38 in 2001. More than 15% of the exploration efforts of all of the world's larger companies were expected to take place in Canada in 2002, up from 14% in 2001 (**Figure 41**). The proportion of all global exploration efforts taking place in Canada stood at about 11% during each of the previous three years. Before the large increase in exploration activity that occurred in developing countries starting in the early 1990s, the proportion of all worldwide mineral exploration activity taking place in Canada stood at 18%.

Figure 40

Exploration Budgets of the World's Larger Companies for Selected Regions of the World, 2002

Companies with Worldwide Budgets of at Least $4.7 Million for Precious-Metal, Base-Metal or Diamond Exploration



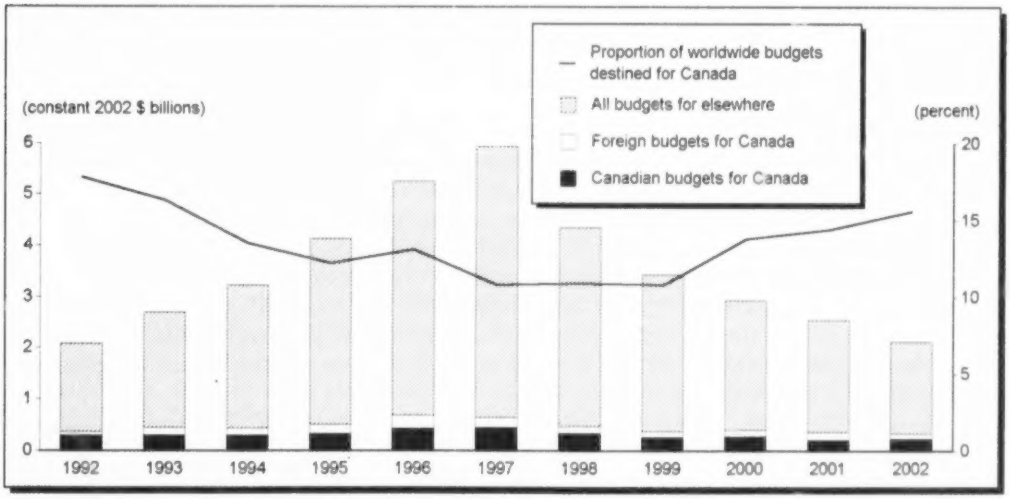
Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.7 million (US$3 million) in 2002 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

Figure 41

Exploration Budgets of the World's Larger Companies for Canada and Elsewhere, 1992-2002

Companies with Worldwide Budgets of at Least $4.7 Million in 2002 for Precious-Metal, Base-Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.7 million (US$3 million) in 2002 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

At the end of 2002, there were more than 3400 mineral properties with recent exploration activity in this country[29] (**Figure 39**).

3.5.1 Larger Canadian-Based Companies in Canada

In 2002, 28 of the larger Canadian-based companies allocated, in total, $228 million for mineral exploration in Canada. Their exploration budgets were up by more than $20 million, or 10%, from the $207 million they allocated in 2001.

For the third year in a row, Canadian companies planned to spend more on mineral exploration in Canada than in all of Latin America. From 1995 to 1999, Canadian-based companies had spent more in that region of the world than in this country.

The larger Canadian-based companies control 69% of the larger-company mineral exploration market in Canada. Because mineral exploration is such an international enterprise, the dominance of exploration programs by domestic firms is relatively uncommon. In 2002, there were only six other countries where domestic companies controlled more than half of the larger-company market for mineral exploration: Australia and Sweden (52% each), Brazil (59%), Russia (66%), South Africa (77%), and Japan (100%). Although, during 2002, the larger-company market for mineral exploration was valued at almost $330 million in Australia, at over $140 million in Brazil, and at roughly $80 million in each of South Africa and Russia, it was valued at less than $20 million in Sweden and at less than $5 million in Japan.

With increasing globalization, the share of the domestic exploration market controlled by Canadian-based companies has fallen gradually as foreign-based companies have increased the amount of activity that they undertake in this country. In 1992, Canadian-based companies controlled 80% of the larger-company mineral exploration market in Canada. However, by 2000, they controlled only two thirds of it. Since the early 1990s, the share of the exploration market controlled by the larger domestic firms has also fallen gradually in the United States and Australia. Although Canadian companies operate all over the world, Canada remains the country where they conduct, by far, the largest proportion of their global mineral exploration programs (**Figure 42**).

3.5.2 Foreign-Based Companies in Canada

During 2002, 14 of the larger foreign-based companies planned to spend, in total, almost $105 million on mineral exploration in Canada (**Figure 41**). This represents more than 30% of all activity planned for this country; however, in 2001, that proportion was 45%. Compared with the previous year, the budgets of foreign-based companies for Canada decreased by more than $55 million in 2002. This reflects, in part, the natural progression of mineral development activity from exploration to capital investment, and to mineral production, particularly in the case of diamonds.

In 2002, the larger foreign-based companies active in mineral exploration in Canada included BHP Billiton Limited-BHP Billiton Plc and WMC Limited, both based in Australia; Echo Bay Mines Ltd., Newmont Mining Corporation, and Phelps Dodge Corporation, all based in the United States; Anglo American plc, Boliden Limited, Lonmin Plc, and Rio Tinto plc, all based in Europe; Anglo American Platinum Corporation Limited, AngloGold Limited, the De Beers group, and Impala Platinum Holdings Limited (IMPLATS), all based in South Africa; and the Mexican mining consortium, Grupo México S.A. de C.V.

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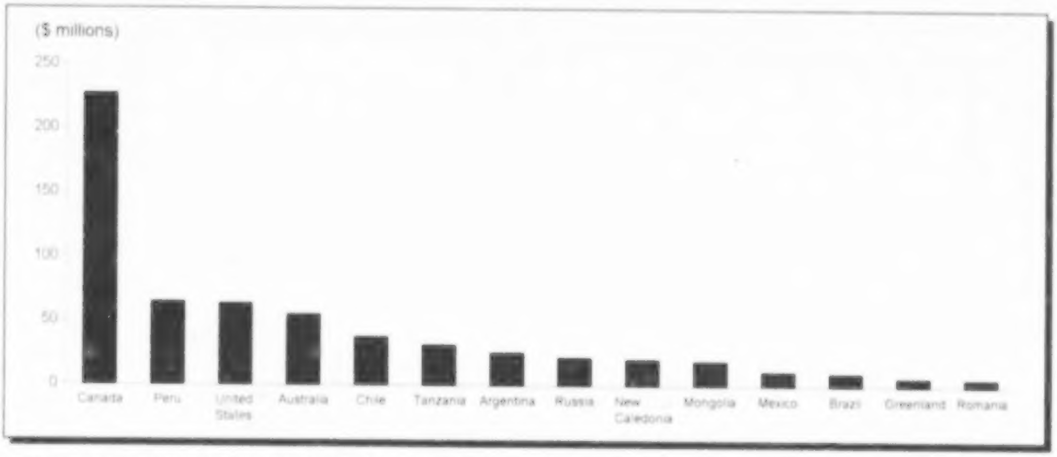
[29] For trends in mineral deposit appraisal activity in Canada over the interval 1982-97, and for a list of projects at the deposit appraisal stage in the late 1990s, see André Lemieux, "Canada's Global Mining Presence," in the 1996 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 8.9 and 8.11-8.22 (www.nrcan.gc.ca/mms/cmy/content/1996/08.pdf).

Figure 42

Exploration Budgets of the Larger Canadian-Based Companies, 2002 - Countries Accounting for 90% of Canadian Budgets

Companies with Worldwide Budgets of at Least $4.7 Million for Precious-Metal, Base-Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.7 million (US$3 million) in 2002 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

In 2002, De Beers reported an exploration budget for Canada of more than $40 million. This represents the largest budget reported by all domestic and foreign companies operating in this country. BHP Billiton, whose budget for Canada was $28 million, had the second largest budget. De Beers' entire exploration budget for Canada is aimed at diamonds, as is 70% of BHP Billiton's. These two companies alone accounted for half of all larger-company budgets for diamond exploration in Canada in 2002.

3.6 LARGER CANADIAN-BASED COMPANIES ABROAD

In 2002, the larger Canadian-based companies planned to spend over $445 million on mineral exploration outside of Canada (**Figure 40**). Their budgets were down by $105 million, or by almost 20%, from the more than $550 million that they had planned to spend in 2001.

Two thirds of the worldwide budgets of the larger Canadian-based companies were allocated to programs abroad in 2002, somewhat less than in 2001. The foreign programs of the larger Canadian-based companies, as a proportion of their domestic and foreign programs combined, peaked at over 78% in 1997. In 1992 that proportion was only about 40%.

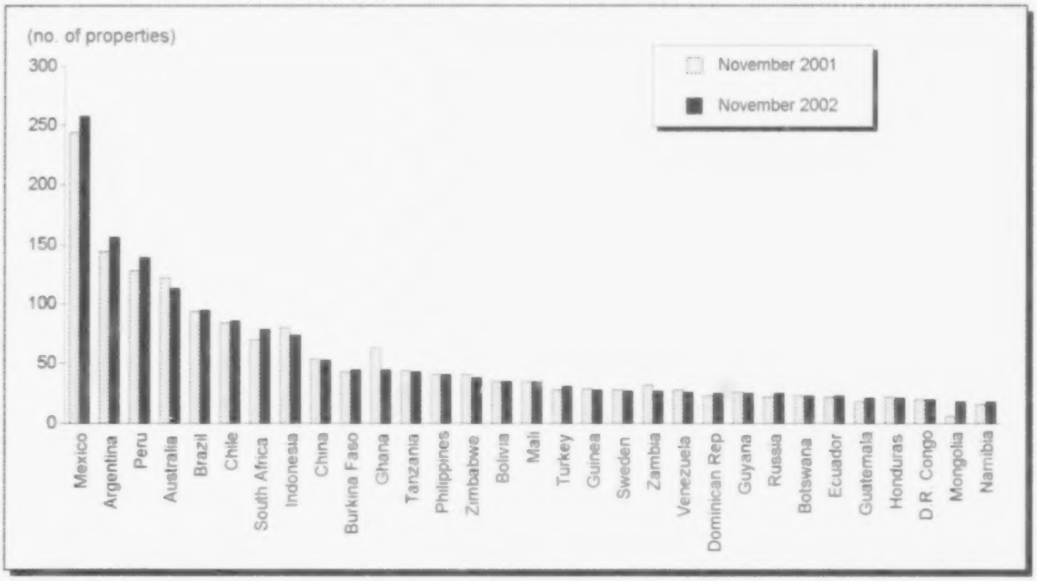
At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of almost 2700 mineral properties located abroad (**Figure 39**), about the same as in the previous year. Foreign properties now represent slightly more than 40% of the total mineral property portfolio held by all companies listed in Canada, down from about half in 2001. In 1992 that proportion was only one quarter.

Apart from the United States, where companies of all sizes listed on Canadian stock exchanges have a substantial mining presence, about 30 other nations spread across the globe account for most of the balance of their foreign mineral property portfolio (**Figure 43**).

Figure 43

Canadian Mineral Property Portfolio Abroad, 2001 and 2002 – Countries Accounting for 80% of Canadian Holdings Located Outside the United States in 2002

Companies of All Sizes Listed on Canadian Stock Exchanges



Source: Natural Resources Canada, based on InfoMine db, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

Canadian companies have interests in over 200 mines, smelters, refineries, plants under construction, or other advanced mineral development projects in roughly 60 foreign countries.[30] Canadian companies also have hundreds of other projects at the early stages of exploration in these countries and in more than 40 others.

At the beginning of 2003, there was at least US$54 billion worth of new copper, diamond, gold, iron, nickel, PGMs, silver or zinc mining projects, each with a value of at least US$65 million, either at the planning, feasibility, construction or deferred stage of development in Canada or elsewhere around the world.[31] Although only 9% of the total value of those projects was expected to be invested in this country, Canadian companies were expected to participate in roughly 30% of all this current mining investment around the globe.

The activities of Canadian mining companies in Canada and abroad have fostered the development in this country of over 2200 suppliers of specialized mining goods and services. Many of these suppliers, such as some drilling companies, export their products all over the world.[32]

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[30] For a list of mines, smelters, refineries and other advanced mineral development projects in which companies based in Canada had an interest in mid-2001, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.16-7.19 (www.nrcan.gc.ca/mms/pubs/services-mines-e.pdf).

[31] "Project Investment Survey 2003," *Engineering & Mining Journal*, January 2003, pp. 28-34.

[32] For a discussion of the global market for mining goods and services and the role played by Canadian companies, see André Lemieux, *Canadian Suppliers of Mining Goods and Services: Links Between Canadian Mining Companies and Selected Sectors of the Canadian Economy*, Natural Resources Canada, Ottawa, September 2000, 84 pp. (www.nrcan.gc.ca/mms/pubs/services-mines-e.pdf).

3.6.1 United States

In 2002, the larger-company mineral exploration market in the United States was valued at almost $160 million (**Figure 40**), or roughly 8% of the $2.1 billion larger-company market worldwide. Larger-company budgets for the United States were down by $40 million compared with those of the previous year. Eleven of the larger Canadian-based companies planned to spend, in total, almost $65 million in the United States, down from $110 million in 2001.

In 2002, the share of the larger-company exploration market held by Canadian-based companies in the United States fell to 45%, down from 55% the previous year. Since the early 1990s, Canadians have increased their share of the exploration market in the United States almost every year. The United States ranks third in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 42**).

During 2002, Canadian companies were expected to spend $20 million more on exploration in the United States than U.S. companies. American companies have budgeted progressively decreasing amounts for mineral exploration in their country most years since the early 1990s. Although U.S. companies accounted for almost 60% of the value of all exploration programs in their country in 1992, their activities represented less than 30% in 2002.

In late 2002, companies of all sizes listed on Canadian stock exchanges held interests in about 575 mineral properties in the United States (**Figure 39**), roughly the same number that they held at the end of the previous year. In 2000, they had projects located in 22 states, but their efforts were concentrated mainly in the western part of the country in Nevada, Alaska, California, Arizona, Montana, Idaho, Wyoming, Colorado, Washington, Utah and South Dakota in decreasing order.[33] That year, Nevada alone accounted for more than 250 of their mineral properties, or almost 40% of the total Canadian portfolio in the United States.

Although Canadian companies have considerably expanded their activities in Latin America, Africa and Asia since the early 1990s (**Figure 39**), the United States is likely to remain, for the foreseeable future, the foreign country where they hold their largest portfolio of mineral properties. At the end of 2002, the United States accounted for over 20% of all properties held abroad by companies of all sizes listed on Canadian stock exchanges.

3.6.2 Latin America and the Caribbean

In 2002, the larger-company mineral exploration market in Latin America and the Caribbean was valued at $600 million (**Figure 40**), or 28% of the $2.1 billion larger-company market worldwide. During 2002, the larger Canadian-based companies planned to spend over $154 million in the region, down by $25 million, or 13%, compared with 2001.

Over the 12-year period 1991-2002, the global mining industry invested more than US$7.2 billion (current dollars) in mineral exploration in Latin America and the Caribbean. Companies listed on Canadian stock exchanges accounted for one third of that investment.

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[33] For the geographic distribution of mineral properties in which Canadian companies have an interest in the United States and in Mexico, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.5 and 7.7 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

After Canada, Latin America has become the region of the world where Canadian companies are the most active in mineral exploration. However, from 1995 to 1999, Canadian companies spent more on mineral exploration in Latin America and the Caribbean than they did in this country.

In 2002, Canadian companies held more than 27% of the larger-company market in Latin America and the Caribbean. The value of Canadian exploration programs stood a close second to those of companies based in the region. The share of the exploration market held by local companies stood at 31% in 2002, roughly the same as in the previous two years; in 1994, local companies held less than 15% of the market in the region.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in about 1000 mineral properties in Latin America and the Caribbean, about the same as in 2001. Since 1996, the total number of mineral properties held by Canadian companies in the region has exceeded the number held in the United States (**Figure 39**).

3.6.2.1 Mexico

In 2002, the larger-company mineral exploration market in Mexico was valued at $68 million, or 3% of the $2.1 billion larger-company market worldwide. Larger-company budgets for Mexico were almost 20% lower than those in the previous year.

Mexico is one of the relatively few countries where domestic companies carry out a significant proportion of mineral exploration programs, even if it is not the dominant share. Together the Mexican companies Industrias Peñoles, S.A. de C.V. and Grupo México were expected to undertake roughly one quarter of the exploration programs planned for the country during 2002.

Mexico ranks fourth in Latin America and eleventh in the world in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 42**). Five of the larger Canadian-based companies planned exploration programs in Mexico in 2002. These companies were expected to spend, in total, about $7 million there.

Mexico is one of the countries where the smaller Canadian companies are spending roughly as much on mineral exploration as their larger Canadian counterparts. At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in almost 250 mineral properties in Mexico, about the same as in 2001.

3.6.2.2 South America

In 2002, the larger-company mineral exploration market in South America was valued at over $475 million, or more than 20% of the $2.1 billion larger-company market worldwide.

Twelve of the larger Canadian-based companies planned to spend, in total, over $150 million in the region, about the same as in the previous year. Their programs accounted for 30% of all mineral exploration activity in South America. Canadian companies held the dominant share of the mineral exploration market in Peru, Chile and Argentina. These countries rank second, fifth and seventh, respectively, in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 42**).

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in over 600 mineral properties throughout South America, about the same as in the previous year. They held more than 150 properties in Argentina, almost 140 in Peru, more than 75 in each of Brazil and Chile, about 30 in Bolivia, and about 25 in each of Venezuela, Guyana and Ecuador.

3.6.2.3 Central America

In 2002, the larger-company mineral exploration market in Central America was valued at roughly $6 million, or less than 1% of the $2.1 billion larger-company market worldwide. None of the larger Canadian-based companies reported exploration programs in the region.

However, Central America is one of the regions of the world where the smaller companies dominate mineral exploration. In 2002, the smaller Canadian-based companies were expected to undertake more than 80% of the $13 million smaller-company exploration programs planned for the region.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in about 80 mineral properties throughout Central America. They held 15 or more in each of Guatemala, Honduras and Panama.

3.6.2.4 Caribbean

In 2002, the larger-company mineral exploration market in the Caribbean was valued at about $0.2 million, or less than 1% of the $2.1 billion larger-company market worldwide.

None of the larger Canadian-based companies reported exploration programs for the Caribbean. However, as was the case in Central America, the smaller Canadian-based companies dominated mineral exploration in the Caribbean during 2002.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in roughly 40 mineral properties in the Caribbean, most of them in the Dominican Republic.

3.6.3 Europe and the Former Soviet Union

In 2002, the larger-company mineral exploration market in Europe and the former Soviet Union (FSU) was valued at $190 million (**Figure 40**), or almost 9% of the $2.1 billion larger-company market worldwide. The market for exploration in the region apparently grew by $55 million compared with 2001, but this was due in large part to information on activity in the region that became available for the first time in 2002.

The larger Canadian-based companies planned to spend $40 million in the region, equivalent to roughly 20% of the market. The value of Canadian programs in 2002 was $10 million less than in 2001.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in 200 mineral properties in Europe and the FSU (**Figure 39**), about the same as in 2001.

3.6.3.1 Western Europe

In 2002, the larger-company mineral exploration market in western Europe was valued at almost $80 million, or roughly 4% of the $2.1 billion larger-company market worldwide. The market in the region grew by $15 million compared with the previous year. The larger Canadian-based companies planned to spend almost $18 million in western Europe, equivalent to more than 10% of the market. Canadians were expected to carry out all of the exploration programs planned for Greenland and Norway.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in more than 90 mineral properties in western Europe. They held roughly 30 in Sweden, 15 in Greenland, and 10 in each of Portugal and Spain.

3.6.3.2 Eastern Europe

In 2002, the larger-company mineral exploration market in eastern Europe was valued at $21 million, or roughly 1% of the $2.1 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $9 million in eastern Europe, equivalent to about 40% of the market. Canadian-based companies held the dominant share of the market in Romania.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in 55 mineral properties in eastern Europe. They held more than 30 in Turkey and roughly 10 in each of Romania and Greece.

3.6.3.3 Former Soviet Union

In 2002, the larger-company mineral exploration market in the countries of the FSU was valued at more than $80 million,[34] or roughly 4% of the $2.1 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $24 million in the FSU, 60% more than in 2001.

The larger-company market for mineral exploration in the FSU apparently grew by more than $40 million in 2002 compared with 2001. This apparent increase occurred largely because Russian-based Alrosa Diamond disclosed its annual exploration budget for the first time in 2002. The exploration budget of this company, all of which was destined for Russia, was estimated at over $50 million.

Russia is the country of the FSU where the larger Canadian-based companies planned to undertake most of their exploration programs in 2002. They were expected to spend $24 million there, equivalent to 30% of the market.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in over 50 mineral properties in six countries of the FSU, about the same as in the previous year. The number of properties held in Russia stood at 25.

3.6.4 Africa and the Middle East

In 2002, the larger-company mineral exploration market in Africa and the Middle East was valued at more than $330 million (**Figure 40**), or more than 15% of the $2.1 billion larger-company market worldwide. Africa accounts for almost all of the mineral exploration market in the region.

3.6.4.1 Africa

In 2002, the larger-company mineral exploration market in Africa was valued at over $325 million, or more than 15% of the $2.1 billion larger-company market worldwide. The larger Canadian-based companies planned to spend more than $50 million in Africa, equivalent to over 15% of the market on that continent.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in over 530 mineral properties in 35 countries on the African continent, roughly the same number as at the end of the previous year. Canadian companies held interests in 80 properties in South Africa, more than 40 in each of Burkina Faso, Ghana and Tanzania, and more than 30 in each of Mali and Zimbabwe.

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[34] The size of the mineral exploration market in certain regions of the world is under-estimated because there are few data available on the extent of exploration programs undertaken by some private enterprises or state agencies.

3.6.4.2 *Middle East*

In 2002, the larger-company mineral exploration market in the Middle East was valued at roughly $7 million. The larger Canadian-based companies planned to spend $0.2 million there, equivalent to 2% of the market in the region.

3.6.5 Asia-Pacific

In 2002, the larger-company mineral exploration market in Asia-Pacific was valued at $490 million (**Figure 40**), or roughly one quarter of the $2.1 billion larger-company market worldwide. The value of exploration programs in the region in 2002 was $130 million less than in 2001.

The larger Canadian-based companies planned to spend $111 million in the Asia-Pacific region, equivalent to over 23% of the market. Even though their budgets for Asia-Pacific in 2002 were maintained at the same level as in 2001, their share of the market increased by about 5%.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in 350 mineral properties in Asia-Pacific (**Figure 39**), the same number they held at the end of the previous year.

3.6.5.1 *Southeast Asia*

In 2002, the larger-company mineral exploration market in Southeast Asia was valued at almost $70 million, or slightly more than 3% of the $2.1 billion larger-company market worldwide. Exploration budgets for the region were down by $65 million compared with those of the previous year. In Indonesia alone, exploration programs were expected to be reduced by more than $35 million.

The larger Canadian-based companies planned to spend $12 million in the region, equivalent to more than 16% of the market there. Canadian budgets for individual countries were relatively small and no single company planned to spend much more than $4 million in any single country.

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in almost 150 mineral properties in Southeast Asia, about the same as in the previous year. They held about 70 properties in Indonesia and more than 40 in the Philippines.

3.6.5.2 *East Asia*

In 2002, the larger-company mineral exploration market in east Asia, which includes China, Japan, Mongolia and South Korea, was valued at $38 million, or almost 2% of the $2.1 billion larger-company market worldwide. The larger Canadian-based companies planned to spend over $20 million in the region, equivalent to more than 60% of the market.

Since the early 1990s, there has been considerable Canadian interest in the mineral potential of China and in the significant growth in demand expected to occur there for many mineral commodities.

3.6.5.3 *South Pacific*

In 2002, the larger-company mineral exploration market in the South Pacific was valued at $368 million, or more than 17% of the $2.1 billion larger-company market worldwide. Although there were increases in some countries, budgets for the region were down by $72 million, or by 16% compared with those of the previous year. Activity in Australia alone was expected to decrease by over $80 million, which represents the largest reduction in activity anywhere in the world for a single country from 2001 to 2002.

The larger Canadian-based companies planned to spend $76 million in the South Pacific, equivalent to over 20% of the market in the region. Australia and New Caledonia rank fourth and ninth, respectively, in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 42**).

At the end of 2002, companies of all sizes listed on Canadian stock exchanges held interests in almost 130 properties in the South Pacific, of which roughly 90% were located in Australia.

3.6.5.4 South Asia

In 2002, the larger-company mineral exploration market in South Asia, which includes India, Pakistan and Sri Lanka, was valued at about $16 million, or less than 1% of the $2.1 billion larger-company market worldwide. The larger Canadian-based companies reported no exploration programs for that region of the world in 2002.

3.7 SUMMARY AND OUTLOOK

In 2002, the larger Canadian-based companies planned to conduct mineral exploration programs valued at almost $675 million in Canada and elsewhere around the world. As a result, Canadians were expected to undertake 32% of the $2.1 billion in exploration programs planned that year by all of the world's larger companies. The share of the global mineral exploration market controlled by Canadian companies is the largest, by far; it is about twice as large as the share controlled by companies based in Africa or in Australia.

Almost 16% of the world's larger-company mineral exploration activities was expected to occur in Canada in 2002, somewhat more than in 2001. Canada became, during 2002, the country where the world's companies are the most active in mineral exploration. During the 10-year period from 1992 to 2001, the world's mining companies had spent more on mineral exploration in Australia than in any other country.

During 2002, and for the third year in a row, Canadian exploration programs for Canada were larger than those they planned for all of Latin America. Canadian companies were expected to carry out the largest share of exploration programs, not only in this country, but also in the United States, eastern Europe and East Asia. They planned to undertake almost as much exploration in South America as all of the companies based in that region of the world combined. Although Canadian companies have diversified their portfolio of mining interests to well over 100 countries, Canada remains the country where they continue to be, by far, the most active in mineral exploration.

Mineral commodity prices have remained relatively low. This affects the amount of profits that producers can reinvest in mineral exploration. Companies with exploration funds are focussing their efforts on their most promising assets. For many of the smaller companies, financing exploration projects continues to be difficult and, as a result, many of them are inactive.

The larger-company exploration market is becoming increasingly concentrated. The number of companies spending the equivalent of US$3 million per year on exploration (C$4.7 million in 2002) has decreased significantly since the late 1990s when financing was readily available. In the case of Canadian companies, the number of larger companies has fallen from an all-time high of 141 in 1997 to fewer than 40 in 2002.

Transnational mergers and acquisitions have become a frequent occurrence in the mining industry. As a result, the industry is becoming increasingly more globalized in its operations. In Canada, the share of the mineral exploration market controlled by foreign companies has grown from 20% in 1992 to slightly more than 30% in 2002.

Although Canadian companies tend, on average, to have smaller exploration budgets than their competitors, they are considerably more numerous than companies based elsewhere. As a result, Canadians are likely to continue, for the near future at least, to dominate mineral exploration worldwide.

APPENDIX 1

Historical Exploration and Deposit Appraisal Statistics

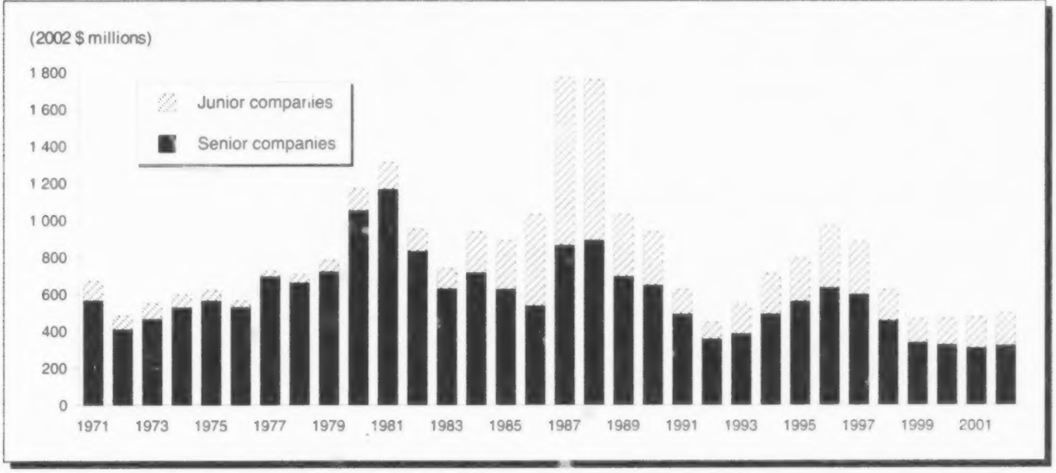
INTRODUCTION

Appendix 1 contains data and analyses that are based on the pre-1997 survey definitions when only field and overhead costs were considered. While more restricted by this measure of exploration and deposit appraisal activity, the data are available over a much longer time period. The resulting time series provides a useful statistical tool for studying historical trends in Canadian mineral exploration spending.

HISTORICAL SUMMARY

Figure 44 depicts Canadian exploration and deposit appraisal expenditures (field and overhead costs only) in constant 2002 dollars over the period 1971 to 2002. Above-normal expenditures in the 1980-82 period resulted from high prices for gold, silver and copper over much of that period. Spending declined somewhat in 1983, but generally rose from 1984 to 1988 as a result of the

Figure 44
Exploration and Deposit Appraisal Expenditures (1) **(Field Work and Overhead) in Canada by Junior and Senior Companies, 1971-2002**



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Includes on-mine-site and off-mine-site activities.

Notes: Total expenditures for 1975-81 are overstated by an average of about 17% relative to earlier and later years because of changes to the methodology used by Statistics Canada over the years. Data for 2002 are final. Expenditures for 1997 to 2002 include both exploration and deposit appraisal costs as per the new survey definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal phase were reported under "exploration," broadly speaking.

introduction by the federal government, in 1983, of the Mining Exploration Depletion Allowance (MEDA). MEDA was replaced in 1989 and 1990 by the Canadian Exploration Incentive Program (CEIP). By 1987 and 1988, expenditures had reached unprecedented high levels because of MEDA and the high gold prices that had prevailed until the end of 1987. However, spending fell dramatically after 1988 and decreased until 1992, when it reached its lowest inflation-adjusted level since 1966.

Activity picked up gradually in the 1993-96 period. Expenditures increased by 118% from 1992 to 1996, and the 1996 level of $974 million (2002 dollars) was the highest since 1989. Although exploration and deposit appraisal spending declined somewhat to $882 million (2002 dollars) in 1997, it still remained relatively strong by historical standards. However, spending dropped significantly in 1998 to $622 million (2002 dollars), a decline of 30% from 1997. At $465 million, the 1999 total represents a further drop of 25% from the 1998 level and the second lowest total in almost the past four decades. The recovery began almost imperceptibly in 2000 when field and overhead spending increased by $2.6 million and gathered momentum in 2001 with a further gain of $7 million to reach $474 million. Data on field and overhead spending for 2002 show a continuation of this upward trend with total field and overhead expenditures of $497 million.

Returning to 1992, the relatively higher expenditure levels that were recorded in ensuing years resulted, to a great extent, from important discoveries of diamond deposits. These discoveries led companies to invest vast sums of money into advanced exploration or deposit appraisal projects and in mine development activities. As indicated in Chapter 1 of this report, well over $1 billion has been spent on the search (exploration and deposit appraisal only) for diamonds since 1994.

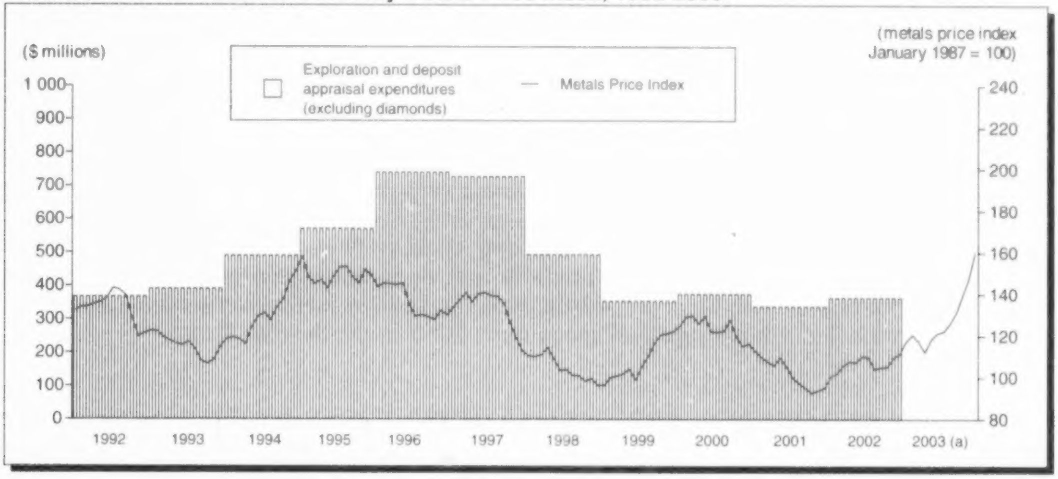
Another major contributor was the late 1994 nickel-copper-cobalt discovery at Voisey's Bay, Labrador, a result of exploration for diamonds in that area, which attracted a lot of attention, especially from junior exploration companies. The resulting flurry of exploration and deposit appraisal activity in the area also had a strong impact on expenditures, particularly in 1995 and 1996.

A combination of factors took over after 1997 to bring Canadian mineral exploration and deposit appraisal activity to dangerously low levels where both the resilience of the Canadian junior mining sector and the ore reserve sustainability of a number of mineral producers were tested. Metal prices, as explained below, constituted the primary factor. Generally low demand for metals was exacerbated by worldwide economic events, including the Asian financial crisis and the September 2001 terrorist attacks in the United States, and companies, especially juniors, had plenty of difficulty in raising exploration funds in the wake of corporate scandals like the Bre-X affair. In this generally negative context, the introduction by the federal government and by some provincial/territorial governments of exploration tax credits and other measures was welcome news and contributed, along with an improving metal price outlook, to the recovery that is currently happening.

METAL PRICES AND EXPLORATION AND DEPOSIT APPRAISAL LEVELS

Under normal circumstances, metal prices are probably the most important factor influencing the level of exploration and deposit appraisal activity. For example, between 1993 and 1995, copper, nickel and lead prices increased by over 60% while zinc and gold prices increased by 14%. Over the same period, field and overhead exploration and deposit appraisal spending (excluding diamonds-related spending and in current dollars) increased by almost 50%. In early 1995, metal prices embarked on a downward trend as reflected by Natural Resources Canada's monthly Metals Price Index (**Figure 45**). After peaking in January 1995, the index began a generally decreasing trend and had fallen by 39% by January 1999, when it reached its lowest level since at least January 1987. The index generally increased from January 1999 to March 2000 when it stood about 35% above the level of January 1999. It then began a downward trend and, in October 2001, following the September 2001 terrorist attacks in the United States and amid generally low metal prices, the index dropped to a new low. The recovery that began afterwards has now picked up considerably due to

Figure 45
Exploration and Deposit Appraisal Expenditures (Field Work and Overhead) in Canada, and Natural Resources Canada's Monthly Metals Price Index, 1992-2003



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(a) At press time, no data were available for field and overhead costs in 2003.
Notes: Exploration and deposit appraisal data up to 2002 are final. For comparison with pre-1997 years, the data include only field and overhead expenditures.

strong gold, nickel and copper prices and, at the end of 2003, the monthly Metals Price Index stood at its highest level in over a decade.

As outlined in Chapter 1, there is a relationship between the level of spending in a particular year and metal prices in earlier years. The decreasing trend in metal prices that began in 1995 was not reflected in spending levels before 1997, partly because of that relationship and partly because of the expenditures on the search for diamonds, which added an element of stability to exploration and deposit appraisal levels. When excluding diamonds, expenditures (field and overhead costs only) peaked in 1996, started declining in 1997, fell even more in 1998 and 1999, recovered somewhat in 2000, dropped again in 2001 and, according to the latest data on this type of expenditures, rebounded in 2002. This relationship outlines the importance of improving metal prices in enticing higher exploration and deposit appraisal spending levels and, based on current price levels, provides for an encouraging short-term outlook

EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY JUNIOR COMPANIES

As shown in **Figure 44**, junior companies have traditionally played an important role in Canadian mineral exploration and deposit appraisal activity. However, their contribution really expanded in 1984, a year after the introduction of MEDA, when their spending accounted for almost 24% of total exploration and deposit appraisal expenditures. That proportion had more than doubled by 1987 when junior companies accounted for $912 million (2002 dollars), or 51% of the total of $1.77 billion spent during that year. Junior spending was also very important in 1988 with almost 50% ($872 million) of total expenditures. Their proportion of total spending then started to gradually decrease until it reached 21% in 1992.

The levels of spending recorded by junior companies in the 1986-88 period are even more impressive when taking into account the fact that, during that period, considerable contributions were made by junior companies to joint-venture projects operated by senior companies. In the survey, these contributions were counted as part of senior companies' spending, thus overstating senior expenditures and understating junior expenditures.

Over the 1993-2000 period, junior spending accounted for approximately 30% of total expenditures (field work and overhead only). The discovery of diamonds in Canada's North and of nickel-copper-cobalt at Voisey's Bay were the two most important positive factors affecting junior spending during those years. Low metal prices, a slowing world economy and difficulties in raising financing explain the more difficult years. The introduction of the federal Investment Tax Credit for Exploration (ITCE) in October 2000 and related provincial tax credits, around that time and subsequently, appear to have been favourable to junior mining companies as their expenditures started to recover faster than those of senior companies. This recovery in junior spending has been strong enough to increase their average share of total spending (field and overhead costs) to about 36% in both 2001 and 2002. The current metal price outlook and the recent eagerness of financial markets to fund mineral exploration activities should help junior companies maintain a healthy share of total Canadian exploration and deposit appraisal spending in 2003 and in the near future.

EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY PROVINCE AND TERRITORY

Tables 24 and **25** show exploration and deposit appraisal expenditures (field and overhead costs only) by province and territory in terms of current dollars and 2002 constant dollars. Both tables cover the period 1989 to 2002, which includes the period when MEDA was replaced by CEIP, the difficult period that led to the trough of 1992, the exciting discoveries of 1993 and 1994, the ensuing increase in spending up to 1996, the downward trend that has brought exploration and deposit appraisal spending down to an almost historical low in 1999, and the latest upward trend that began in 2000.

TABLE 24. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (FIELD WORK AND OVERHEAD) IN CANADA, BY PROVINCE AND TERRITORY, 1989-2002 (CURRENT DOLLARS)

	Total Exploration and Deposit Appraisal (1)													
Province/Territory	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
							($ millions)							
Newfoundland and Labrador	36.2	23.3	12.1	11.1	8.9	12.4	71.1	92.5	58.4	40.8	29.3	23.1	20.7	24.0
Nova Scotia	21.4	11.0	4.5	3.3	1.8	1.7	2.8	6.9	6.7	4.8	3.6	3.0	1.5	1.8
New Brunswick	13.6	16.5	15.8	12.2	11.1	10.0	12.7	14.8	12.2	10.0	10.0	12.0	9.4	3.2
Quèbec	185.0	196.4	138.1	94.1	106.1	130.3	123.4	137.2	168.6	123.5	103.4	89.9	94.8	104.0
Ontario	217.8	152.6	109.7	77.4	75.6	113.0	129.7	194.9	176.5	111.3	81.1	113.7	110.2	121.0
Manitoba	37.0	41.2	29.7	32.0	27.4	40.5	32.6	41.2	40.3	29.5	22.6	27.7	28.5	29.6
Saskatchewan	63.3	42.2	31.5	25.9	53.1	50.6	43.8	50.6	49.9	57.8	36.0	40.0	34.4	35.2
Alberta	6.2	10.7	6.6	5.4	7.3	9.4	10.6	10.8	20.5	21.6	11.4	6.1	4.3	5.6
British Columbia	186.6	226.5	135.7	71.6	66.0	85.0	79.4	104.9	95.8	44.3	33.4	29.9	25.6	34.5
Yukon	15.1	18.4	16.5	9.7	19.2	25.7	39.3	46.4	40.6	17.5	12.2	9.9	7.3	7.4
Northwest Territories	45.7	36.0	31.6	42.7	100.7	149.5	172.2	194.5	150.7	114.8	61.0	45.3	75.2	59.8
Nunavut	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	33.8	57.4	58.1	71.3
Total field work (excluding overhead)	703.5	660.3	439.2	323.5	410.1	540.5	608.1	835.9	749.5	522.4	387.6	412.3	415.8	434.8
Total exploration and deposit appraisal (including overhead)	827.9	774.7	531.8	385.3	477.3	628.1	717.6	894.8	820.2	575.9	437.9	458.1	470.1	497.2

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

. . Not available.

(1) For comparison with pre-1997 years, the data include only field and overhead expenditures. They do not include other related expenditures such as those for engineering, environment and land access.

Notes: Numbers may not add to totals due to rounding. Data are final.

TABLE 25. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (FIELD WORK AND OVERHEAD) IN CANADA, BY PROVINCE AND TERRITORY, 1989-2002 (2002 DOLLARS)

	Total Exploration and Deposit Appraisal (1)													
Province/Territory	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	(2002 $ millions)													
Newfoundland and Labrador	45.2	28.2	14.2	12.9	10.2	14.0	78.7	100.7	62.8	44.0	31.1	23.5	20.9	24.0
Nova Scotia	26.7	13.3	5.3	3.8	2.1	1.9	3.1	7.5	7.2	5.2	3.9	3.0	1.6	1.8
New Brunswick	17.0	20.0	18.6	14.2	12.7	11.3	14.1	16.1	13.1	10.8	10.6	12.3	9.5	3.2
Québec	231.0	237.5	162.2	109.1	121.3	147.3	136.4	149.3	181.2	133.3	109.7	91.7	95.7	104.0
Ontario	271.9	184.5	128.9	89.8	86.4	127.7	143.5	212.1	189.7	120.1	86.1	116.0	111.3	121.0
Manitoba	46.2	49.8	34.9	37.1	31.4	45.8	36.1	44.9	43.3	31.8	24.0	28.3	28.7	29.6
Saskatchewan	79.0	51.0	37.0	30.0	60.8	57.2	48.5	55.0	53.7	62.4	38.2	40.8	34.8	35.2
Alberta	7.7	12.9	7.8	6.2	8.4	10.6	11.7	11.8	22.0	23.3	12.1	6.2	4.3	5.6
British Columbia	233.0	273.9	159.4	83.0	75.5	96.0	87.8	114.1	103.0	47.8	35.4	30.5	25.9	34.5
Yukon	18.9	22.3	19.4	11.2	22.0	29.1	43.4	50.4	43.6	18.9	13.0	10.1	7.4	7.4
Northwest Territories	57.1	43.5	37.1	49.5	115.2	169.0	190.4	211.7	162.0	123.9	64.7	46.2	75.9	59.8
Nunavut	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total field work (excluding overhead)	878.4	798.5	516.0	375.1	469.0	611.0	672.6	909.5	805.8	563.8	411.4	420.5	419.7	434.8
Total exploration and deposit appraisal (including overhead)	1 033.7	936.8	624.8	446.9	545.8	710.0	793.6	973.5	881.7	621.6	464.7	467.2	474.5	497.2

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

n.a. Not applicable.

(1) For comparison with pre-1997 years, the data include only field and overhead expenditures. They do not include other related expenditures such as those for engineering, environment and land access.

Note: Numbers may not add to totals due to rounding. Data are final.

APPENDIX 2

Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures

HISTORY OF CANADIAN EXPLORATION STATISTICS

In Canada, mineral exploration statistics have been collected, in one form or another, since 1946. From 1946 to 1963, Statistics Canada compiled "cost of prospecting" data for metal mines for Canada and the provinces. Companies were surveyed from 1964 to 1966, but the data were not compiled. However, using the filled-out survey questionnaires for those three years, Natural Resources Canada (NRCan) was able to estimate expenditures for that period. From 1967 to 1987, Statistics Canada compiled and published both mine-site and general exploration expenditures, as well as mine-site development expenditures and other capital and repair expenditures. From 1985 to 1987, NRCan collected detailed field work expenditures. Since 1988, NRCan has been fully responsible for the survey of non-producing entities that have any type of exploration expenses. Statistics Canada continued to survey producing firms until 1997.

A review of survey definitions was carried out in the mid-1990s to improve the quality of the survey. This revision was undertaken by the Federal-Provincial Committee on Mineral Statistics, in consultation with industry, and was completed in 1997. The resulting Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures was designed to better describe the full mineral development cycle (**Table 26**) and to provide more comprehensive measures of investment in the Canadian minerals and metals industry. Statistics from this survey include detailed information on feasibility studies and other more technically related costs that were previously excluded. The redesigned survey also provides a clearer distinction between the primary exploration and deposit appraisal phases, and additional information on associated environmental costs. Since 1997, NRCan has been fully responsible for the coordination of the federal-provincial/territorial preliminary and forecast survey, and partially responsible for the annual survey for both non-producing and producing firms.

SURVEY PROCESS

Two questionnaires are distributed each year. For example, for the survey period 2002/03, the *2002 preliminary estimate* and *2003 intentions* survey was conducted during the last quarter of 2002 and compiled in January 2003. The more detailed *final* survey questionnaires for 2002 were distributed in early 2003. The results of this *final* survey were compiled during the course of 2003. A *revised forecast* survey was also conducted during the course of 2003 by contacting the project operators who had reported spending intentions in the *2002 preliminary estimate* and *2003 intentions* survey as well as those that had failed to do so. The *preliminary estimate* and *intentions* survey usually provides preliminary results on the year in which the survey was conducted and a forecast for the coming year that is based on company spending intentions. The *final* survey provides a wealth of project-specific information, including the types of commodities explored for, the type of field work undertaken, related overhead expenditures, the type of company involved, joint-venture partners, and other details.

TABLE 26. GENERALIZED MODEL OF THE MINERAL RESOURCE DEVELOPMENT AND MINING PROCESS

PHASE	MINERAL RESOURCE ASSESSMENT	MINERAL EXPLORATION					MINERAL DEPOSIT APPRAISAL				MINE COMPLEX DEVELOPMENT	MINE PRODUCTION	ENVIRONMENTAL RESTORATION
		GRASS-ROOTS EXPLORATION											
	MRA	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MCD	MP	ER
STAGE	Various surveys, research and synthesis.	Exploration planning.	Regional reconnaissance and surveys.	Prospecting and ground surveys of anomalies.	Verification of anomalies and showings.	Discovery and delimitation of a mineral deposit.	Mineral deposit definition.	Project engineering.	Project economics.	Feasibility study, production decision.	Mine development, construction of processing plant and infrastructure.	Production, marketing and renewal of reserves.	Mine complex closure and decommissioning, site restoration.
OBJECTIVES	Supply information and tools required to develop the mineral potential of the nation for economic benefit, in the perspective of sustainable development.	Select target commodities. Establish exploration objectives and strategies. Select target areas and sites. Acquire claims or permits if appropriate.	Seek anomalies of interest over wide areas by various survey methods. Select the more promising targets. Acquire claims or permits.	Confirm the presence, exact location and characteristics of anomalies. Acquire claims, leases and properties.	Investigate the cause of anomalies. Find mineral show-ings. Acquire additional claims, leases and properties.	Discover, delimit and interpret grade, quality and tonnage of a new mineral deposit. Determine if it constitutes a mineral resource of "potential economic interest" to justify more intensive and detailed work.	Define the limits, controls and internal distribution of grades, mineralogy and mineral processing characteristics of the deposit. Acquire all data required for project engineering and cost estimation.	Determine, in an iterative fashion, the design, plans, schedules, capital cost and operating cost estimates for all aspects of the project. Establish technical feasibility and costs thoroughly and realistically.	Obtain all the information required and determine, based on corporate objectives, parameters for the economic, financial and social-political evaluation of the project.	Diligently validate and integrate project data, interpretations, estimations, plans and evaluations to achieve MCD and production objectives. Decide on whether to undertake the mining project. Obtain permits and financing.	Complete mine development and construction on schedule and within budgets and specifications. Ensure efficient and timely mine complex start-up according to schedule, specifications and cash flow forecasts.	Achieve commercial production on schedule and meet cash flow forecasts and quantity and quality specifications. Achieve mine profitability and company survival in the perspective of sustainable development.	Restore mine site, outside plant and infrastructure to environmentally acceptable condition. Ensure the future quality of the environment.
EVALUATION METHODS	Geoscientific, mineral and economic surveys, research, compilations and synthesis by governments, research institutes, universities and industry.	Metal and mineral market research. Review of geological and ore deposit information and of the legal, fiscal and socio-political context in various areas.	Remote sensing, aerial photography and airborne geophysics. Prospecting, geology and geochemistry. Appraisal, rating and selection of anomalies.	Ground, geological, geochemical and geophysical prospecting and surveys. Compilation, appraisal and selection of significant anomalies.	Geological mapping and other surveys. Trenching, drilling and sampling. Appraisal of results, recommendations for further work, and selection of new targets.	Stripping, trenching, mapping, sampling drilling and down-hole geophysics. Initial mineral processing tests. Environmental and site surveys. Mineral resource estimation and	Detailed mapping, sampling and drilling on surface or from underground. Systematic mineralogy and mineral processing tests. Detailed environmental and site surveys. Prefeasibility studies.	Pilot tests, engineering design and planning. Capital and operating costs for mining, mineral processing, infrastructure, environmental protection and restoration. Technical risk analysis. Prefeasibility studies.	Market, prices, product development and financial studies. Environmental, economic, financial, and socio-political risk analysis. Prefeasibility studies.	Exhaustive due diligence review of all data, interpretations, plans and estimates. Evaluation of profitability, given the geological, technical, financial and qualitative risks, and the up-side	Project management methods in a quality assurance perspective. Training program for personnel and detailed start-up plan to meet the requirements of this demanding period.	Production management methods to ensure continuous quality and efficiency improvements. Exploration, deposit appraisal and development of new zones or deposits on-mine-site and off-mine-	Mine closure and decommissioning. Environmental restoration and monitoring.
RESULTS	Maps, data bases tools and models.	Exploration projects.	Regional anomalies.	Local anomalies.	Mineral showings.	Mineral deposit.	Deposit appraisal project			Mining project.	Mining complex.	Mineral production.	Restored site.
MINERAL INVENTORY	UNDISCOVERED MINERAL POTENTIAL					INFERRED RESOURCE	DELIMITED MINERAL RESOURCE				MINERAL RESERVE		
	SPECULATIVE			HYPOTHETICAL			INDICATED	INDICATED AND MEASURED			PROVEN AND PROBABLE		
ESTIMATION ERROR (targeted margin of error of tonnage/grade estimates at the 90% confidence level)						± 100%	± 50%	Indicated: ± 50 to ± 30% Measured: ± 20 to ± 10% (often several sample grid dimensions are used in each category)			Proven (feasibility: ± 10%, mining: ± 5%)		Full compliance
INVESTMENTS	Moderate	Low, but increasing multiple investments					Larger and increasing multiple investments				Very large industrial investment.		
RISK LEVEL	Low	Very high, but decreasing risk of failure and financial loss					High, but decreasing risk of failure				Moderate to low industrial risk.		

Sources: Modified by D.A. Cranstone, A. Lemieux and M. Vallée, February 25, 1994, from M. Vallée, 1992, *Guide to the Evaluation of Gold Deposits*, CIM Special Volume 45, p. 4, and *SOQUEM Annual Report*, 1976-77, pp. 4 and 5. Revised by M. Vallée and G. Bouchard, January 2001.

The questionnaires for the preliminary and forecast survey were distributed in the fall of 2002 and the questionnaires for the final survey were distributed in early 2003. Some companies receive more than one questionnaire depending on the number of provinces/territories in which they are conducting activities. To avoid duplicate reporting, joint-venture participants who are not project operators do not report expenditures on such joint-venture projects. Companies are asked to report expenditures for the calendar year surveyed.

The survey is a full census of all the companies involved in mineral exploration, deposit appraisal and mine complex development in Canada. To protect the confidential data provided by the respondents, only aggregate statistics are released. However, specific information can be added when such information has already entered the public domain.

DEFINITIONS USED IN THE SURVEY

A number of definitions were introduced in the 1997 redesign of the survey to more closely reflect the current realities of Canadian mineral exploration and development activities. These definitions were developed and agreed upon by federal, provincial/territorial and industry representatives, and they were tested by companies that volunteered to ensure their relevance and applicability. The following is a summary of the definitions most referred to in this report. For a more comprehensive list of definitions, along with more complete descriptions, the reader is invited to consult the Reporting Guide for the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Expenditures. This guide is available from Natural Resources Canada or from provincial/territorial survey partners.

Mineral Development Phases (Work Phases)

Exploration expenditures represent all field activities, including capital, repair and maintenance expenditures, carried out (on- or off-mine-site) to search for, discover and carry out the first delineation of a previously unknown mineral deposit to establish its potential economic value (tonnage and grade) and to justify further work.

Deposit appraisal expenditures represent all field activities, as well as capital, repair and maintenance expenditures, carried out (on- or off-mine-site) to bring a delineated deposit to the stage of detailed knowledge required for a feasibility study to justify and support a production decision and the investment required.

Mine complex development expenditures include all mine development, capital (construction, machinery and equipment), repair and maintenance expenditures carried out on a mine property that is in production or committed to production.

Mine development expenditures include all activities carried out on a property that is in production or committed to production to define, block out, and gain access to the ore and prepare it for production. Mine development also includes drilling, rock work and support to extend the current ore reserves.

Location of Activity

On-mine-site expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration or deposit appraisal for an additional mineral deposit separate from the current mine reserves and located strictly on an existing mine site in production or committed to production.

Off-mine-site expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration or deposit appraisal that are not located on a mine site that is in production or committed to production. Off-mine-site includes the sites of temporarily or permanently closed mines and advanced projects not yet committed to production.

A *mine site* is an area than can be accessed and exploited from the current or committed installations; hence, the size of this area will vary depending on the commodity under consideration, attitude (horizontal vs. vertical), type and extent of the deposit(s), and the mining method(s) in use.

For a mine site to be *committed to production*, all of the following criteria must be met: (i) a production feasibility study has been completed; (ii) a formal production decision has been reached by the organization; (iii) the necessary financing is on hand or has been arranged; (iv) all required authorizations and permits have been obtained; and (v) major pieces of production equipment have been purchased or ordered.

Surface and Underground Field Surveys and Work (Includes Field Overhead)

Surface and underground field surveys and work includes expenditures associated with geoscientific surveys, drilling, rock work, other field costs, and engineering, economic and feasibility studies. It includes wages, salaries, fringe benefits, food, accommodation and other services, equipment rentals, all vehicle expenses, transportation costs (for people and equipment), and all related technical activities/services such as planning, data collection, interpretation, mapping and reports. The costs incurred by the project operator and contractor(s), as well as field supervision and management costs, are also included. All surveys and work done for environmental purposes are entered under the environment section. This would apply, for example, to geochemical or geophysical surveys performed to characterize or monitor the environment.

Engineering studies include all expenditures related to the additional studies, tests and pilot work (mining, mineral processing, metallurgy, dewatering, etc.), plans, designs and appraisals required to establish the technical feasibility of a mining project.

Economic studies include all expenditures for economic studies (markets, product development, price studies, financing, etc.) required to establish the economic feasibility of a mining project.

Feasibility studies include all expenditures related to prefeasibility project reviews and to the production of feasibility studies required to develop and mine a deposit, and to obtain the required leases, permits and authorizations (excluding environmental and land access expenditures).

Environment-Related Expenditures

Environmental characterization includes all costs of environmental characterization and assessment (including environmental impact studies).

Environmental permits include all costs related to the process of meeting the legal and regulatory requirements or guidelines for environmental assessment and for obtaining permits (including preproduction permits) required for the work program under consideration.

Environmental protection includes costs for monitoring (additional to normal practices) and complying with laws, regulations and guidelines related to air emissions, liquid effluents, ground pollution, and wildlife and habitat protection. Environmental fines, if any, are included in this category.

Environmental restoration includes all costs of decommissioning, reclaiming and restoring, and monitoring, if required, after the completion of exploration and deposit appraisal field work.

Land Access-Related Expenditures

Land access requirements, permits and damages include all costs related to establishing impact and benefit statements, socio-economic agreements, and other requirements for mine complex development and mine production, and the costs of rights of way, damages and permits for exploration and deposit appraisal work, including all associated legal fees, but excluding all environment-related costs.

Capital, Repair and Maintenance Expenditures

Capital expenditures for construction, machinery and equipment include expenditures by the company for work performed by contractors or by the company for its own account, such as salaries and wages, materials and supplies, and other charges such as engineering and consulting fees. Environment-related capital expenditures for protection and site restoration are included in this category.

Non-capitalized *repair and maintenance expenditures* consist of the gross non-capitalized repair expenditures on non-residential buildings, other structures and machinery, the costs of maintaining the restored mine site, and the routine care of assets, including environmental monitoring of the restored mine site.